

DESCRIPTIONS OF NEW AND CRITICAL NOTES UPON
PREVIOUSLY KNOWN FORMS OF NORTH
AMERICAN OEDIPODINAE (ORTHOPO-
TERA; ACRIDIDAE)

First Paper

BY JAMES A. G. REHN

For a number of years it has been one of the author's ambitions, to make a thorough and comprehensive systematic study of the forms of the genera of that section of the North American Oedipodinae centering about the genus *Trimerotropis*. From whatever angle we had approached this complex of genera, whether in attempting generic studies, the presumably much simpler determination of scattered material or in detailed faunistic studies, it speedily became evident that the classification left much to be desired in the way of interpreting the true valuation of characters, appreciation of variation, relationship of forms and generic affinities, as well as the generic position of certain species. The difficulties encountered tended to concentrate our attention upon these genera, and the opportunity to study the problem in the desired fashion was something for which we continually strived.

The greatest desideratum was material and for over twelve years the field work of Hebard and Rehn has had this proposition as one of its main objectives. We now have before us for study a series of specimens of the genera under consideration, running into the tens of thousands, by far the greater portion collected by Hebard and Rehn and with full field data. After extensive series, type examination was next in importance, and we feel fortunate in having been able to examine, or now have in our possession, by far the majority of the types of the forms of the genera, at least as far as they are known to be in existence.

The critical work upon our projected study has been under way for some months, and in certain genera all the comparative work has been completed. Our plan is to publish in the course of a few years an extensive detailed work upon the genera studied,

but as it is desirable for various reasons to bring out the descriptions of the new forms already located, and certain of our conclusions relative to the relationship of some of the previously known ones, we are introducing them in the present form.

The types of all the new forms here described are in the Hebard Collection, and the paratypical material is in that collection and that of the Academy of Natural Sciences of Philadelphia.

Our earnest thanks are due our colleague, Mr. Hebard, for many helpful suggestions, and also for the gift of the colored plate accompanying this paper.

The Haydenii Group of the Genus Derotmema

We find this group consists of three geographic races or subspecies, for which the oldest, and consequently the specific, name is *haydenii* of Thomas.¹ Scudder's later *cupidineum*² is a pure synonym of *haydenii*, as type examination shows. Saussure's *brunnerianum*³ is another pure synonym of *haydenii*, which latter name was apparently unknown to Saussure at that time. Typical *haydenii* is the race of the Great Plains region from Montana to New Mexico.

In the Great Basin and Snake River regions we find a related form which intergrades with *haydenii haydenii* in Wyoming, and to this Saussure's name *rileyianum*⁴ is applicable, as material from the type locality and the original lot shows. Scudder,⁵ by an interpretation of his *cupidineum* not warranted by his original description or material, shifted his name to this Great Basin form, where it clearly does not belong. The Great Basin race must be known as *Derotmema haydenii rileyianum*.

In western Texas and northern Mexico we find a third geographic race, which occurs typical in the Great Bend country of trans-Pecos Texas, north to Marfa and Sierra Blanca, occasionally not fully typical at the latter locality, and, at Marathon, Texas,

¹ *Oedipoda haydenii* Thomas, Ann. Rep. U. S. Geol. Surv. Terr., v, p. 460, (1871). ["Above Fort Fetterman on the North Platte," Wyoming.]

² *Derotmema cupidineum* Scudder, Ann. Rep. Chief of Engineers, 1876, p. 513, (1876). [Northern New Mexico.]

³ *Derotmema brunnerianum* Saussure, Prodr. Oedipod., p. 155, (1884). [Colorado.]

⁴ *Derotmema rileyianum* Saussure, Prodr. Oedipod., p. 156, (1884). ["Salm County" [Salmon City], Idaho.]

⁵ Proc. Amer. Acad. Arts and Sci., xxxv. no. 19, 391, (1900).

to the eastward showing a marked Great Plains influence in instability of features and tendency toward *D. h. haydenii*. Southward in Mexico it is known to occur as far as Camacho, Zacatecas. This subspecies is new and is here described.

Derotmema haydenii mesembrinum⁶ new subspecies Plate XXVI, figs. 1 and 2; plate XXVIII, figs. 1 and 2.)

This race is more nearly related to *D. h. haydenii* (see plate XXVI, figs. 3 and 4; plate XXVIII, figs. 3, 4, 5 and 6), from which it is chiefly separable in the male sex having the eyes larger, more prominent and protuberant, more circular in basal outline and deeper in proportion to the infra-ocular portion of the genae, and in the slightly broader pronotum; in the female sex it can be distinguished by the eyes being slightly more prominent and the pronotum distinctly broader, particularly the metazonal portion of the disk. From *D. h. rileyianum* (see plate XXVIII, figs. 7 and 8) the present race differs in the male sex having more prominent eyes, which are somewhat more elevated, although not as rounded in basal outline, more prominent fastigio-facial angle when seen in profile, and in the prozonal lobes of the median carina of the pronotum being of the type found in *D. h. haydenii*; in the female sex differing much as in the male sex, but with features less decidedly indicated, also in the pronotum having the metazona appreciably broader and in general more deplanate on the disk.

Type.—♂; Double Windmill,⁷ Brewster County, Texas. Elevation, 2725 feet. September 3, 1912. (Rehn and Hebard.) [Hebard Collection, Type no. 490.]

Description of Type.—Agrees fully with virtual topotypes of *D. h. haydenii*⁸ except in the following characters. Eyes more globose, when seen from dorsum with width across eyes very appreciably greater than width of metazonal disk, in profile more circular and depth and width more nearly subequal, instead of appreciably deeper than wide, as in the typical form of the species; in cephalic aspect appreciably more protuberant, making width across eyes decidedly greater, instead of but moderately greater, than greatest width across genae. Pronotum with the metazona of disk slightly more transverse.

Allotype.—♀; Marfa, Presidio County, Texas. Elevation, 4650 to 4750 feet. September 1, 1912. (Rehn and Hebard.) [Hebard Collection.]

⁶ From *μεσημβρινον*, southern.

⁷ Appearing on the recent government topographic map as "Twin Mills."

⁸ From Casper, Wyoming.

Description of Allotype.—This sex differs from virtual topotypes of the same sex of *D. h. haydenii* in the following characters. Eyes slightly more prominent and globose when seen from the dorsum, with width across eyes faintly greater than, instead of subequal to, the width of metazonal disk, in profile as in male sex; in cephalic aspect slightly more protuberant, making width across eyes subequal to, instead of slightly less than, the greatest width across genae. Pronotum with the metazona of the disk broad, relatively short, greatest width across same nearly equal to greatest length of pronotum.

Coloration of type and allotype not distinctive, when compared with *D. h. haydenii*. Both red and yellow disks are present on the wings, as in the typical form of the species.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Greatest width of pronotal disk	Length of tegmen	Length of caudal femur
Double Windmill, Texas, <i>type</i>		15.1	3.3	2.7	15.8	8.9
Double Windmill, Texas, <i>para-type</i>		15.4	3.2	2.7	17	9
Marfa, Texas, <i>paratype</i>		15.4	3	2.8	17.9	10.2
Puertacitas Mountains, Texas, <i>paratype</i>		15.8	3.4	3	17.5	9.4
	♀					
Marfa, Texas, <i>allotype</i>		23.8	4.8	4.5	25	12.5
Persimmon, Gap, Texas, <i>paratype</i>		23.6	5	4	24	13

Specimens Examined: 46; 18 ♂, 28 ♀.

TEXAS: Sierra Blanca, El Paso County; Puertacitas Mountains and Marfa, Presidio County; Double Windmill and Persimmon Gap, Santiago Mountains, Brewster County and Marathon, Brewster County.

COAHUILA: Monclova and Jimulco.

DURANGO: Lerdo.

ZACATECAS: Camacho.

A male from Double Windmill, bearing the same data as the type; a male from Marfa with the same data as the allotype; a male from Puertacitas Mountains, Presidio, Texas, elevation 5100 to 5200 feet, August 30, 1912; and a female from Persimmon Gap, Santiago Mountains, Brewster County, Texas, September 3, 1912, are designated paratypes. All of these specimens were collected by Rehn and Hebard.

The Mexican specimens are typical of this race, as are all the paratyptic individuals. The Sierra Blanca specimens (four males, eleven females) are practically typical, occasional individuals showing *D. h. haydenii* influences. The Marathon series (eight

males, ten females) is virtually intermediate between the typical form of the species and the race here described. These specimens are variable individually from a truly intermediate condition to practically typical *D. h. mesembrinum*. From this information the area of typical *mesembrinum*, and the points at which intergradation becomes evident, can be determined.

The present subspecies was always found on adobe soil, generally bare, but occasionally with scattered bushes and grass. Double Windmill is in the middle of the broad Maravillas Valley between the Santiago Mountains and the high broken country to the east, an extremely arid and very hot locality, an uninhabited watering station on the Marathon-Boquillas road, about forty miles south of Marathon.

Derotmema piute new species⁹ (Plate XXVI, figs. 5, 6, 7 and 8; plate XXVIII, figs. 9, 10 and 15).

This striking species is related to *D. delicatulum* and *laticinctum* Scudder, but is more removed from the latter than from the former. There is no close relationship with *D. haydenii* or *sauseanum*.

From *delicatulum* the new species can be separated by the more robust form, more distinctly vertical face with very weak interantennal angle profile, proportionately broader head when seen in cephalic aspect, more strongly transverse pronotum, the tegmina more appreciably narrowed distad when compared with the width of their proximal half, very ample anal field of tegmina, slightly broader wing, shorter and more robust caudal limbs, the abbreviation being shared by the tarsal joints, and the generally distinct and more complete transverse banding of the tegmina and caudal limbs. From *laticinctum*, *piute* can be separated by the slightly more vertical face, slightly more prominent eyes, which are more circular in basal outline, smoother pronotal surface, more regularly angulate caudal margin of pronotal disk, narrower lateral lobes of the pronotum, the shorter, broader and more distally narrowed tegmina, the broader wing, which has the band always narrower and much weaker, the shorter and more robust limbs, and, in the female sex, in the more slender and straighter ovipositor jaws.

⁹ Named for the Indians native to the Walker River region and adjacent country of Nevada.

Type.—♀; Mason, Lyon County, Nevada. Elevation, 4500 feet. September 5, 1910. (Rehn and Hebard.) [Hebard Collection, Type no. 493.]

Description of Type.—Size relatively small: form robust, tegmina and wings shorter and broader than usual in genus: surface dull; tegmina almost entirely coriaceous, briefly subhyaline distad.

Head relatively large, broad: occiput moderately elevated in profile, interspace between eyes dorsad subequal to transverse width of eye: fastigium strongly and regularly arcuate declivent, broad, very shallowly arcuate-excavate, lateral margins weakly but appreciably elevated, in outline subovoid, greatest width ventro-cephalad, median carina distinct but very low: frontal costa moderately broad (for genus), in general moderately expanding ventrad, obsolete ventrad on face, margins bisinuate and constricted dorsad of the insertion of the antennae and ventrad of the median ocellus, continuous with fastigial margins; costa of moderate width at junction with fastigium, weakly and incompletely sulcate, V-shaped impression at fastigial junction distinct, acute: in profile fastigium regularly passes into facial outline, latter nearly vertical, very weakly arcuate; interantennal projection slightly arcuate: width of head across genae faintly less than that across eyes: eyes very prominent, in basal outline nearly circular, slightly flattened dorsad, the depth very faintly greater than that of the infra-ocular portion of the genae; from cephalic and dorsal aspects the eyes are seen to be quite prominent: antennae slightly more than three-fourths as long as caudal femora, slender.

Pronotum broad and short, the greatest width across metazona of disk subequal to greatest length, subsellate in form, surface largely rugulose, pale areas on lateral lobes relatively smooth; transverse sulcus almost straight, intersecting median carina at about middle: cephalic margin of disk arcuate produced mesad; caudal margin of disk obtuse-angulate, the margin regularly and evenly converging to the apex, which is very weakly rounded: median carina low and carinulate cephalad on prozona, subarcuate in profile, obsolete caudad on prozona, with the group of three tubercles found in some species of the genus represented by low bosses on a transverse fold; median carina of metazona delicately carinulate, low: surface of metazona with rugulosities to some extent connected and erratic: lateral carinae not evident on prozona, very weak but evident on the rounded metazonal humeral shoulders: lateral lobes slightly deeper than broad; caudal margin gently arcuate from humeral angle to the broadly arcuate ventro-caudal angle; surface of metazona of lobes cribroso-reticulose.

Tegmina three times as long as head and dorsum of pronotum combined, broad proximad, their width there but slightly less than length of pronotum, narrowed distad, the width at distal sixth subequal to length of metazona of disk: costal margin of tegmina straight from costal lobe to briefly proximad of apex, i.e. point measured above, thence to rounded apex arcuate; sutural margin straight in the greater portion of its length, the sutural and costal margins moderately converging distad: anal field of tegmina relatively broad, proximad

nearly equal in width to length of prozona, regularly narrowing distad, reaching practically to the tegminal apex. Wings relatively broad, greatest width contained slightly less than twice in length.

Mesosternal interspace strongly transverse, cephalic margin of interspace very weakly obtuse-angulate, internal angle of lobes rounded rectangulate, caudal margin of lobes obliquely truncate: metasternal interspace not narrower than mesosternal interspace, strongly transverse, shallow, cephalic margin arcuate, lobes angulately converging caudad. Ovipositor jaws moderately compressed; dorsal valves moderately upcurved in distal third, ventral valves gently arcuate decurved in distal half.

Cephalic and median limbs of medium length, slender, the femora appreciably enlarged distad. Caudal femora faintly more than two and one-half times as long as dorsum of pronotum, moderately robust for the genus, the greatest depth contained slightly more than four times in greatest length; dorsal carinae faintly sublamellate in proximal half; external paginal pattern regular: caudal tibiae slightly shorter than femora, slightly sinuate proximad, armed on external margin with eight, internal with ten to twelve spines: caudal tarsi short, second and third joints together subequal in length to the proximal joint.

Allotype.—♂: same data as type. [Hebard Collection.]

Description of Allotype.—Differing from female sex in the following noteworthy features.

Size small: tegmina more extensively subhyaline, a considerable portion of distal half of such structure.

Head with least width of interspace between eyes equal to three-fourths of transverse width of eye: frontal costa with supra-antennal constriction much more decided than in female, there narrowly but distinctly and below broadly but appreciably sulcate: width of head across genae three-fourths of width across eyes: eyes very prominent, slightly exserted, the depth slightly but appreciably greater than that of infra-ocular portion of genae: antennae in length subequal to caudal femora.

Pronotum with surface smoother, less rugulose and more shagreenous than in female: median carina slightly higher and more angulate in profile than in female; tubercles caudad on prozonal disk more distinct and acute; lateral carinae obsolete on metazonal shoulders: lateral lobes with metazona cribroso-shagreenous.

Tegmina slightly less than three times as long as head and pronotum combined.

Mesosternal interspace with cephalic margin of interspace subtruncate: metasternal interspace slightly narrower than mesosternal interspace.

Caudal femora with greatest depth contained slightly less than four times in length of same: caudal tibiae with eight spines on external margin and ten spines on internal margin.

General pale tone of dorsal coloration varying from pale tilleul-buff, through pinkish buff to vinaceous-pink, the face, genae, much of the lateral lobes, portions of pleura and pale areas on cephalic and median limbs and on external face of caudal femora hoary white. Darkened markings of occiput, pronotum, tegmina and limbs ranging from bister to mummy brown: on the pronotum this is usually restricted to a darker edging at the irregularly angulate junction of the hoary ventral portions and colored dorsal section, this brown edging occasionally being isolated from the dorsum of the pronotum by additional hoary white, which in a single specimen (one female; Mason, Nevada) includes most of the dorsum; occasionally the dorsum and much of the pronotal lateral lobes is somberly uniform brownish (both Mina females); tegmina with dark maculations relatively small and quadrate, frequently weakly grouped into two principal transverse bands, one proximal and the other mesal, the proximal the more solid, the intervening pale areas and distal section with scattered maculations, which show tendencies, when grouped at all, to assemble along the sutural margin and the humeral trunk. In the dully colored individuals from Mina and several weakly contrasted specimens from Mason, the tegmina, and for that matter the pronotal markings, are little evidenced. Wings with disk varying from very pale naphthaline yellow to pale citrine yellow, the color never decided and dilute peripherad; distal portion clear hyaline except for vein infuscation; wing band ranging from the faintest trace in a relatively few cells, with no spur, to a fairly well-marked and moderately broad band, with a connected, well-marked spur, extending half way to wing base, the band becoming obsolescent periphero-proximad; in color the band ranges from raw umber to mummy brown. Rarely a distinct band and a well indicated spur are present but not connected. Eyes ranging from ochraceous-orange through buckthorn brown and tawny to dresden brown and mummy brown. Antennae whitish pink, broadly annulate with blackish brown, this condition subobsolete distad. Cephalic and median limbs annulate with blue-black (intensive) to fuscous (recessive); caudal femora with the dark bars of similar color, oblique on external face and there occasionally incomplete, distinct dorsad. Caudal tibiae pale, external face with a distal, a pre-median and a proximal darkening of variable intensity and definition, internal face faintly washed with pale veronese green to glaucous blue, increasing in intensity distad. Venter and abdomen light buff to light ochraceous-buff, the surface often with numerous scattered small blotches of buckthorn brown. Dorsum of abdomen proximad french green to empire green.

The Mason series is, as a whole, sharply, brightly and contrastingly colored; the Mina representation is duller, the females quite dull, with little contrast, while the male is more contrasted, but duller than the Mason specimens. The extremes of wing band condition are found in the Mina males.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest caudal width of pronotal disk	Length of tegmen	Length of caudal femur
♂					
Mason, Nevada, <i>allo-</i> <i>type</i>	15	3.3	2.7	14.5	8.9
Mason, Nevada, <i>paratype</i>	13.2	2.9	2.7	14.5	8.4
Mina, Nevada, aver- age of seven <i>para-</i> <i>types</i>	14.3 (13.7-15.5)	3.1 (3-3.4)	2.5 (2.4-2.8)	14.9 (14.2-16)	8.5 (8.2-9)
♀					
Mason, Nevada, <i>type</i>	20.4	4.1	3.5	19	10.4
Mason, Nevada, aver- age of six <i>para-</i> <i>types</i>	20 (18.5-21.2)	4.1 (4-4.3)	3.4 (3.2-3.7)	18.8 (18.2-19.8)	10.4 (10-11.2)
Mina, Nevada, <i>para-</i> <i>type</i>	20.5	4.2	3.4	19	9.9
Mina, Nevada, <i>para-</i> <i>type</i>	20.8	4	3.4	19	10.5

In addition to the type and allotype we have before us one male and six females bearing the same data as the type, and seven males and two females taken at Mina, Mineral County, Nevada; elevation, 4350 feet; September 3 and 4, 1910; (Rehn and Hebard.). All the specimens here recorded, in addition to the type and allotype, are considered paratypes.

In structure the series shows certain features of variation. The pronotum, as usual in any series of the species of the genus, shows some variation in breadth to length, in one extreme being slightly longer than greatest breadth across the metazona of disk. The frontal costa shows a slight degree of variation in the strength of the constrictions and in the continuity of the sulcation, while the lateral carinae vary in their indication, being occasionally obsolete in the male and never stronger than in the type. The median carina of the pronotum is weakly variable in the arcuation of the cephalic portion of the prozonal section, and in the degree of indication on the caudal portion of the same section. The tegmina vary from three to over three times in length of head and pronotum combined, while the wings are occasionally broader than in type, being one and six-tenths times width in length. The mesosternal interspace has the cephalic margin varying from

as described to nearly straight, while the lobe angles vary in the extent to which they are rounded. The caudal femora have the depth varying from three and one-half to slightly more than four times in the length. The caudal tibiae have from seven to nine external, and from eight to twelve¹⁰ internal marginal spines.

At Mason the species occurred on a gravelly alluvial slope with fairly heavy but scattered bush vegetation, and also in a depression of the slopes with similar cover. The species was scarce in the former situation, and more numerous, but not common, in the latter location. At Mina the insect occurred in but one environment, this was on ground strewn with rock fragments, the general location being to the east of the broad playa in the middle of the valley in which Mina is located, and where there is a similar but sparser vegetation than found at Mason. The species was not common, and individuals were secured only after long and careful search.

The Plattei Group of the Genus Mestobregma

This group is composed of two sections, one comprising *plattei* and its races and the second composed of *impexum* and *terricolor*, both of the latter very distinct new species, here described.

The races of *Mestobregma plattei* number three. These are: *plattei plattei*,¹¹ which is the form of the Great Plains region, south to southern Colorado; *plattei corrugata* (Scudder),¹² ranging from northern New Mexico southward, and *plattei rubripenne* (Bruner)¹³ of central and southern Arizona. In our detailed projected study of the genus we will discuss the relationship, synonymy and variation, as well as detailed distribution, of these forms.

The *impexum-terricolor* section of the group is moderately cohesive, made up of the two species, which agree in eye outline, and to a certain degree in pronotal form, but differ in the form of the frontal costa, fastigio-facial angle, mesozonal carina, length of lateral lobes and general form. *Impexum* is nearer *plattei* than *terricolor*, and the latter is an evident tendency toward *Trepidulus*, yet in all general features it is a true *Mestobregma*.

¹⁰ The latter on one margin in type only.

¹¹ 1873. *Oe(dipoda) plattei* Thomas, Rep. U. S. Geol. Surv. Terr., v, p. 123. ["Near Platte River in Colorado and Wyoming."]

¹² 1902. *Conozoa corrugata* Scudder, in Scudder and Cockerell, Proc. Davenport Acad. Sci., ix, p. 33. [Fillmore Canyon, Organ Mountains, New Mexico.]

¹³ 1905. *Trachyrhachis rubripennis* Bruner, Biol. Cent.-Amer., Orth., ii, pp. 175, 177. [Oracle, Arizona.]

Mestobregma impexum¹⁴ new species (Plate XXVI, figs. 9 and 10; plate 13 and 14.)

1910. *Mestobregma rubripenne* Rehn and Hebard (not of Bruner, 1905), Proc. Acad. Nat. Sci., Phila., 1909, p. 442. [Cima and Bird Spring Mountains, California.]

The present species can be separated from the component races of *Mestobregma plattei* (see plate XXVI, figs. 11 and 12; plate XXVIII, figs. 11 and 12) by its more robust form, more circular basal eye outline, the much less angulate fastigio-facial angle when seen in profile, and by the sharp and decided constriction of the frontal costa briefly dorsad of the antennal bases. From *M. terricolor*, here described, the present species differs in the more inflated genae, the less decided fastigio-facial angle when seen in profile, in the frontal costa constriction, in the more distinct mesozonal section of the pronotal median carina, in the shorter lateral lobes of the pronotum, the shorter and more robust form and more contrasted coloration.

Type.—♂; Milford, Beaver County, Utah. Elevation, 4900 to 5000 feet. September 5, 1909. (Rehn and Hebard.) [Hebard Collection, Type no. 494.]

Description of Type.—Size medium: form slender, subcompressed: pronotum rugose on dorsal surface.

Head moderately inflated, the genae moderately bullate and with the width across same slightly more than greatest width across eyes: occiput and vertex, when seen from side, distinctly arcuate, ventro-cephalad markedly and sinuately arcuate declivent to the rounded and weakly indicated fastigio-facial angle, which is situated between the antennal bases; face subvertical: fastigium with length and breadth subequal, very shallowly excavate; lateral carinae of fastigium low but clearly marked, subparallel caudad, converging cephalad to about one-half their median separation, the cephalic margin of the fastigium indicated by a more weakly defined, narrowly V-shaped carina, the apex directed caudad: frontal costa appreciably V-foveolate dorsad at its junction with the fastigium, the foveolation in contact with the V-shaped carina of the fastigium, immediately ventrad of this the costa is first strongly, although regularly, constricted, then arcuately expanded between the antennae, at the constriction and dorsad to the foveolation with an appreciable median carina, ventrad of inter-antennal region very faintly constricted, then with margins weakly diverging and becoming obsolete before reaching the clypeal suture; marginal carinae of frontal costa distinct but low, surface of costa ventrad of foveolation very weakly excavate; lateral facial carinae strongly arcuate divergent. Eyes moderately prominent, not elevated dorsad of vertex when seen in cephalic aspect; basal outline very broad ovate, in depth subequal to the infra-ocular sulcus. Antennae slender, nearly twice the

¹⁴ Rude, uncouth—from the rough appearance of the pronotal disk.

combined dorsal length of the head and pronotum, subequal in width, subdepressed proximad.

Pronotum weakly sellate, sub-strangulate, with dorsum rugose, the dorsal length faintly less than the dorsal length of the head, the greatest (caudal) width of the disk but slightly less than the greatest dorsal length: cephalic margin of disk very weakly, though finely, obtuse-angulate; caudal margin of disk sub-rectangulate, the immediate angle narrowly rounded, the margin appreciably cingulate: median carina distinct but not high on the metazona, elevated and moderately bilobate on the prozona, the cephalic section of this about half again as long as the caudal (or mesozonal) one, the former but little higher than the latter and subdeclivent cephalad, the caudal (or mesozonal) section more regularly arcuate; lateral carinae indicated by converging, low, irregular elevations cephalad on the prozona, on caudal (or mesozonal) section of prozona is a distinct, transverse raised area with a pair of impressed pits, lateral shoulders on metazona distinct, rather prominent, noncarinate: metazona slightly longer than the prozona. Lateral lobes of pronotum deeper than long, ventral margin sinuate, the greatest depth caudad, caudal margin sinuate, the greatest width of lobe ventrad, the ventro-caudal angle full and rounded.

Tegmina surpassing the apex of the abdomen by about four-fifths the length of the caudal femur, greatest width contained slightly more than five times in greatest length of same; costal margin with a distinct, but low and relatively short, proximal lobation, distad distinctly arcuate to the rounded acute apex; sutural margin in general subparallel to costal; distal margin obliquely arcuato-truncate: texture coriaceous proximad, becoming more membranous and less closely areolate in distal fourth: intercalary vein present, proximad nearer the ulnar, distad nearer the median vein. Wings moderately long, greatest width contained one and three-quarter times in length of same; apex rounded rectangulate.

Interspace between mesosternal lobes strongly transverse, shallow, the lobes obliquely arcuato-truncate caudad: interspace between metasternal lobes strongly transverse, but little narrower than mesosternal interspace, regular.

Cephalic and median limbs moderately slender. Caudal femora about half as long as the tegmen, of the form usual in the subfamily, greatest width contained three and one-half times in the length, with the lamellation of dorsal carina little indicated and not sharply terminated distad, as in most of the individuals of the genus; pattern of the external paginae regular: caudal tibiae slightly shorter than the caudal femora, armed on the external margin with ten spines and on the internal margin with eleven spines: caudal tarsi relatively short, the metatarsus subequal in length to the other two joints combined.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Differs from the description of the type in the following noteworthy features.

Size rather large: form slightly more robust: surface more rugulose, and of dorsum of pronotum more extensively rugose. Head with whole facial profile, including fastigio-facial angle, less bulging, more regularly low arcuate, with barely appreciable sinuosities: width across genae about one and a third that

across eyes, the genae being moderately bulging; structure of fastigium and frontal costa as in male, but the whole structure broader in proportion. Eyes distinctly smaller in proportion, in depth appreciably shorter than the infra-ocular sulcus. Pronotum slightly longer in proportion to the head; caudal margin of the disk with apex more rounded and lateral portions faintly arcuate-emarginate. Ovipositor jaws moderately slender. Caudal femora with dorsal lamellation more evident and more appreciably excised distad than in male.

Measurements (in millimeters)

			Greatest (caudal) width of pronotal disk		
♂	Length of body	Length of pronotum		Length of tegmen	Length of caudal femur
Milford, Utah, <i>type</i>	17.7	3.6	3.4	20.4	10.5
Milford, Utah, <i>paratype</i>	18.2	4.2	3.5	20.2	10.7
Milford, Utah, <i>paratype</i>	19.5	4.2	3.7	22	11.1
Cima, California	19.4	3.9	3.6	20.6	11.2
♀					
Milford, Utah, <i>allotype</i>	32	5.5	4.9	24.5	13.7
Milford, Utah, <i>paratype</i>	29	5.1	4.5	24.5	13.4
Milford, Utah, <i>paratype</i>	31	5.3	5	26.8	13.5
Cima, California	25.3	4.7	4	23.2	13
Cima, California	26	5	4.3	25.5	13.6
Bird Spring Mountains, Cali- fornia	24 ¹⁵	5	4.5	24.5	12.7

Color pattern of the type found in *Mestobregma plattei*, with sharply contrasted bicolored lateral lobes of the pronotum and *Conozoa*-like contrasted barring on the costal half of the proximal three-fifths of the tegmina. Pale base color ranging from pale clay color to light buff, occasionally in large part, particularly on the head, hoary white; dark pattern color ranging from mummy brown to dark bone brown. Frequent specimens from Milford show a castor gray suffusion, to variable degrees, of the greater portion of the head and dorsum of the pronotum, or of the dark areas alone, and rarely, to an extent, on the lateral lobes of the pronotum. The type shows a tendency in this direction on the dark areas of the dorsum of the head. The transverse dark infra-antennal facial line is smoke black in the male sex, and variable in depth of color, while mesad its costal portion is either lacking or more ventral in position than laterad of the costa. In the female sex this bar is obsolete or subobsolete. Eyes ranging from ochraceous tawny to deep mars brown. Antennae with joints distad of the second fuscous, obscurely alternated (by segments) with dull russet. Pronotum with dark angulate marking on lateral lobes in male sharply contrasted, shining dark bone brown, much weaker in female; dorsum dull, with little contrast. Tegmina with dark bars always sharply contrasted with pale interspaces; sutural section and distal two-fifths with numerous arcuate patches of the darker color. Wings with disk in yellow-winged phase ranging from very weak marguerite yellow (*type*) to primrose yellow; in the red-winged phase it is coral red; wing-band dark bone brown, crossing the

¹⁵ Abdomen abnormally contracted.

wing slightly distad of the middle and following the peripheral margin to as much as half-way to the body, spur broad, heavy, extending more than half-way to the base, costal margin free from spur and of the disk color; distal portion hyaline with few scattered brown areas near margin and along certain of the veins. Limbs with the usual barring of the group, the caudal femora frequently with much hoary white, rarely suffused, on dark areas, with castor gray; caudal tibiae olive buff to bluish glaucous, mottled with brownish proximad, dorsal surface in glaucous type darkened to russian blue, spines black-tipped on bone brown, bases of same of tibial color. In the infrequent castor gray suffused individuals the caudal tibiae are much mottled with this color.

In addition to the type and allotype we have before us eight males and three females taken at Milford, Utah, September 5, 1909, by Rehn and Hebard. We also have for study one male and three females from Cima, San Bernardino County, California, taken August 12, 1907, by Hebard, and one female from the foothills of the Bird Spring Mountains, San Bernardino County, California, taken August 11, 1907, also by Hebard. The Cima and Bird Spring Mountains material was previously recorded by us as *Mestobregma rubripenne*,¹⁶ to which the present species is closely related, but quite distinct. The Milford series we here designate as paratype.

In the series examined, we find some little variation in the Cima male, which has the fastigio-facial angle, in profile, more evident and angulate than in the others; the eyes and costa, however, are typical. Of the Milford series two of the males are red-winged, the remainder, of both sexes, are yellow-winged. One Cima female is red-winged, the remainder and the Bird Spring Mountains individual are yellow-winged. The species was scarce at Milford, occurring on sage covered ridges at 5000 feet and on relatively bare slopes, with scattered sage and yellow-flowered bushes, at 4900 to 5000 feet elevation.

Mestobregma terricolor¹⁷ new species (Plate XXVI, figs. 13, 14 and 15; plate XXVIII, figs. 16 and 17.)

This interesting species is more nearly related to *D. impexum*, here described, than to any other of the genus. It forms with *impexum* a section of the *plattei* group of the genus, and can be distinguished from the component races of *M. plattei* by the less

¹⁶ *Vide supra*.

¹⁷ Meaning *earth-colored*, in relation to the general tone of the coloration of the insect in repose.

inflated ventral portion of the genae, when seen in cephalic aspect, in the more circular basal outline of the eye, in the mesozonal portion of the median carina of the pronotum being weak or subobsolete, but the lateral portions of the mesozonal bifoveolate elevation not reduced, the pronotum thus more sellate than in *plattei*, in the median carina on the metazonal portion of the pronotum being weak, and in the lateral lobes of the pronotum being proportionately longer.

From *impexum* the present species can be distinguished by the less inflated ventral portion of the genae, seen in cephalic aspect, in the more subequal frontal costa, which is not sharply constricted immediately dorsad of the insertion of the antennae, the more produced fastigio-facial angle when seen in profile, the less cristate median carina of the pronotum, the smoother pronotal surface, the more slender and elongate form and duller normally exposed coloration.

The beautiful rose-red disk of the wings appears to be a specific character, as we have seen none with yellow disks.

Type.—♂; Pecos, Reeves County, Texas. Elevation, 2596 feet. September 18, 1912. (Rehn and Hebard.) [Hebard Collection, Type no. 496.]

Description of Type.—Size rather small; form slender, elongate, subcompressed dorsad; surface finely rugulose and dull, particularly in depressed areas, smoother in elevated sections, the dull areas with sparse, very short hairs.

Head less inflated than in the related species: occiput, vertex and fastigium in profile regularly arcuate; fastigio-facial angle well marked, narrowly rounded, obtuse, situated between the antennal bases; facial line moderately retreating; fastigium slightly broader than long, broadly open caudad; lateral margins distinct, parallel caudad, concavely convergent cephalad, the cephalic width of the fastigium less than one-half its greatest width, there closed by a V-shaped carina, as described in *D. impexum* but less evident; surface of fastigium shallowly excavate; frontal costa of medium width, very faintly and broadly narrowed dorsad, gently and broadly expanding between the antennal bases to slightly more than the width of proximal antennal joint, very faintly and broadly narrowed ventrad of this, then regularly, though moderately and in a sub-obsolete fashion, expanding to the clypeal suture; surface of frontal costa as a whole considerably sulcate, weakly foveolate dorsad in contact with fastigial V-carina, sulcation becoming obsolete ventrad; carinal margins as a whole sharp; lateral facial carinae arcuate about antennal bases, thence rather strongly divergent to the clypeal angles. Eyes large, prominent, in cephalic aspect they are seen to be very faintly elevated dorsad of the vertex, the width across the eyes slightly greater than that across genae; in lateral outline the eyes are broad subreniform-ovate, their basal outline less in area than their

lateral outline, due to the eye prominence and globosity; greatest depth of the eye subequal to that of the infra-ocular sulcus. Antennae slightly longer than caudal femora, slender, apex acute, proximal joints (beyond two basal ones) appreciably depressed but not expanded.

Pronotum short, subsellate, weakly strangulate. Disk of pronotum with greatest (caudal) width but slightly less than greatest length of same; cephalic margin of disk very faintly angulate; caudal margin of same subrectangulate, the margin cingulate and very faintly sinuate on lateral portions: metazona one-third again as long as the prozona (prozona s. s. and mesozona) section: median carina on restricted prozona distinct and arcuate but not high; on mesozonal section, which is faintly shorter, distinctly lower, partly obliterated and marked by a median point or knob; on metazona the carina is distinct, continuous, though weak, becoming more elevated caudad: transverse mesozonal elevation more evident than that portion of median carina, crudely resembling a figure eight, the caudal section of the margining carina the higher: lateral carinae represented on prozona solely by several detached points, on metazona by prominent but rounded shoulders: surface of metazonal disk with rugulosity scattered and irregularly transverse in disposition; principal transverse sulcus deeply impressed. Lateral lobes of pronotum deeper than long, greatest depth caudad; ventral margin distinctly arcuato-sinuate cephalad, straight caudad; caudal margin broadly but shallowly concave from the disk to near the ventral margin, where the ventro-caudal section is obliquely truncate; surface of metazona of lobes obscurely cribroso-punctulate.

Tegmina surpassing the apex of the abdomen by slightly more than the combined length of the head and pronotum, narrow, the greatest width contained six times in the length: costal margin with a broad and very low proximal lobation, in distal fifth broadly arcuate to the distal margin, which is completely rounded; sutural margin with a weak concavity distad, corresponding in a lesser degree to the arcuation of the costal margin: texture of the proximal half of the tegmina opaque, gradually becoming more translucent and with sparser areolation distad, but nowhere hyaline: intercalary vein indicated, proximad nearer the ulnar vein, distad intermediate between the ulnar and median veins; axillary vein free. Wings relatively narrow, the greatest width contained twice in the length; apex of anterior field narrowly rounded, axillary field with margin broadly and obliquely arcuate-lobate.

Interspace between the mesosternal lobes strongly transverse, the lobes with their caudal and medio-caudal margin obliquely arcuate; interspace between the metasternal lobes appreciably less than that between the mesosternal lobes, transverse.

Cephalic and median limbs moderately slender. Caudal femora slightly more than half as long as the tegmina, of medium robustness, the greatest depth contained about three and one-third times in the greatest length of the same; dorsal carina but little lamellate; external pagina with pattern relatively regular: caudal tibiae appreciably shorter than the femora, armed on the external margin with nine to ten spines, on internal margin with eleven to twelve spines: caudal tarsi quite short, the metatarsus faintly shorter than the remaining joints combined.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Differing from the description of the type in the following noteworthy features. Size larger. Head with fastigio-facial angle much less prominent in profile, rounded; facial line less retreating; eyes less prominent, in cephalic aspect not elevated dorsad of level of vertex, greatest depth slightly less than that of infra-ocular sulcus. Pronotum with rugulosities of metazonal disk more detached, individual and irregular than in male; ventro-caudal portion of lateral lobes of pronotum more rounded and less oblique truncate than in male. Tegmina surpassing the abdominal apex by less than the length of the pronotal disk. Wing very faintly less than twice as long as broad. Mesosternal lobes less obliquely arcuate than in male, the medio-caudal angle more distinct, though arcuate. Ovipositor jaws relatively short, well recurved, moderately compressed.

Color pattern of the basic *M. plattei* type, but greatly modified by the suppression of virtually all solid exposed dark markings, except the undulate dark line on the lateral lobes of the pronotum and reduced dark blotches on the costal section of the proximal half of the tegmina. General color ranging from warm buff to tawny, often light buff or even hoary white on the head, ventral section of the lateral lobes of the pronotum and cephalic limbs. Dark markings bone brown to clove brown, the pronotal line somewhat shining. Head with a sub-obsolete, fine postocular line and a transverse, weak vertex line of darker, occasionally many cloudings and mottlings present on the genae, occiput and face; eyes antimony yellow to yellow ochre, with several irregularly marked oblique lines of brown: antennae with distal half solid blackish brown; proximal half of the general color, irregularly multi-annulate with blackish brown except on the two proximal segments. Pronotum with median section of disk occasionally weakly clouded with brownish, the caudal margin beaded with, and the carinal and mesozonal elevations touched with, brown: lateral lobes with dark undulate line indicated as distinctly in females as in males. Tegmina with *Conozoa*-like patches of dark brown always evident, occasionally¹⁸ nearly confluent, usually separated by a pale interspace somewhat less than their width, the dark patches not crossing the humeral trunk; distal half of tegmina and discoidal and anal fields with scattered punctulations of dark brown, which distad are areolate and rarely there disposed in an obscure transverse fashion, in the anal field there rarely is a weak transverse barring tendency in the disposition of the punctulations. Wings with disk jasper red; wing-band bone brown, crossing the wing at or very slightly distad of the middle, narrowed and emarginate at the base of the spur, which is broad and extends about two-thirds the way to the base of the wing; peripheral margin with band becoming obsolete half-way to the body: distal section of wing hyaline, with certain veins infusate by pencilling or series of dots; costal margin infusate distad, from band to near the apex; proximal of same narrowly lined with disk color. Abdomen of general color, as a rule with a more yellowish tendency; dorsum of abdomen frequently with proximal segments clouded to a variable degree with dark payne's gray. Cephalic and median limbs

¹⁸ In Grand Canyon female.

usually with narrow incomplete annular patches of blue-black to blackish. Caudal femora with one distinct and several indistinct dark patches on the dorsal surface, external face often quite hoary white, ventral carinae irregularly beaded with brown: caudal tibiae on normally exposed surfaces of general color, on normally hidden surfaces tyrian blue to deep orient blue; spines black tipped on brown.

The Pecos series is quite uniform in general coloration, the wing-band varying somewhat in extent and strength, the disk color constant. The Sierra Blanca specimens and the Las Cruces female are darker in color, less grayish buff in general tone, more brown buff, the pale areas duller and dark areas more extensive. The Grand Canyon female is more like the Sierra Blanca specimens, and, in addition, has the wing-band broader than in any of the other specimens.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Length of tegmen	Length of caudal femur
♂					
Pecos, Texas, <i>type</i>	19.3	3.6	3.4	20.5	11
Pecos, Texas, <i>paratype</i>	20.2	3.9	3.5	22	11
Pecos, Texas, <i>paratype</i>	18.8	4	3.5	21.4	11.4
Sierra Blanca, Texas	18.2	3.8	3.3	20	10.2
♀					
Pecos, Texas, <i>allotype</i>	30.2	5.3	4.8	26.8	14.5
Pecos, Texas, <i>paratype</i>	26.2	4.6	4.2	25.5	13.5
Pecos, Texas, <i>paratype</i>	31.3	5.8	4.9	28.5	15
Sierra Blanca, Texas	24.4	4.9	4.2	23.8	12
Sierra Blanca, Texas	26	5.1	4.5	24.8	13.5
Las Cruces, New Mexico	26.2	5	4.2	26.4	12.8
Grand Canyon, Arizona	25.4	4.6	4	24	12.2

This most interesting species, which is so inconspicuous when at rest in its native environment, and which displays such beautifully colored wings when in flight, is apparently extremely local, and as our material shows has a relatively extensive distribution, of which, at this writing, our knowledge is very incomplete. We have before us a paratypic series of fourteen males and twenty females bearing the same data as the type and allotype; a series of four males and three females taken at Sierra Blanca, El Paso County, Texas, elevation, 4524 to 4950 feet, September 13 to 14, 1912, (Rehn and Hebard); one female, taken at Las Cruces, Donna Ana County, New Mexico on August 5; and a female taken on the plateau below Bright Angel in the Grand Canyon of the Colorado, Coconino County, Arizona, elevation 3500 to 3800 feet, September 12, 1907, (Hebard).

At Pecos the species occurred on the bare spots of an adobe flat, where it was fairly numerous, but very shy and in scattered

colonies. At Sierra Blanca the species was also taken on bare adobe, while on the rocky hills at the same place its relative *Mestobregma plattei corrugata* occurred.

The species shows a distinct tendency toward *Trepidulus*, but it is clearly a *Mestobregma*. It shows, however, the probable line of relationship of the two genera. A species of *Trepidulus* shows an approximately similar tendency toward *Mestobregma*, but the gap between the two remains sufficient to indicate the generic affinities of the respective species.

The Genus Psinidia Stål

This genus is composed of two quite distinct species. *P. amplicornus* Caudell and *P. fenestralis* (Serville). The former was described as a variety, but is very distinct and its distribution within the United States can now be indicated with considerable exactness. The second species, *fenestralis*, is divisible into two geographic races; one, the typical form, distributed over a very extensive area, and the other, which was undescribed, restricted as far as known, to the coastal region of Texas, occurring at the same localities as the very different *amplicornus*.

Typical *fenestralis* ranges from the most northern points of the species distribution south, in suitable environments, to southern Florida and southwest to at least southern Alabama (Flomaton) and the coastal islands of Mississippi (Cat and Ship Islands). Material from Hearne, Robertson County, Texas, is essentially intermediate between the two races.

Psinidia fenestralis frater new subspecies (Plate XXVII, figs. 16, 17 and 18; plate XXVIII, figs. 18 and 19.)

This geographic race can be distinguished from typical *fenestralis* (see plate XXVII, figs. 19, 20 and 21) by its greater size, by having the antennae broader and more ensiform in the proximal two-thirds, by the more declivent fastigium and more evident elevation of the vertex, by the head being more compressed when seen in cephalic aspect, by the median carina of the pronotum being slightly lower and not as straight in profile, the ventro-caudal angle of the lateral lobes of the pronotum more distinct and peg-like, the distal extremity of the tegmina more truncate and less rounded and the jaws of the ovipositor of the female more elongate, more slender and straighter in profile.

Type.—♀; Katherine, Willacy County, Texas. August 8, 1912. (Rehn and Hebard; in nearly bare white sand gully.) [Hebard Collection, Type no. 499.]

Allotype.—♂; same data as type. [Hebard Collection.]

Description.—Size larger than in *P. f. fenestralis*: form elongate. Head with occiput more appreciably ascending than in *P. f. fenestralis*, with head in normal position; vertex in profile more narrowly rounded, the juxta-ocular portions of the fastigial marginal carinae more evident in same view; in profile the fastigium is seen to be slightly more declivent: in cephalic aspect the head is seen to be more compressed and proportionately deeper: antennae heavier, very elongate, at least two and one-half times as long as pronotum, distinctly though not decidedly ensiform, the greatest expansion distinctly greater than width of the proximal joint. Pronotum in profile with the median carina subconcave in the region of the principal transverse sulcus, not straight, as a whole lower throughout than in *P. f. fenestralis*: lateral lobes with ventro-caudal angle having a distinct, slightly swollen, peg-like projection instead of an angulation of the margin. Tegmina with the distal extremity oblique, moderately truncate, not essentially rounded as in *P. f. fenestralis*. Dorsal ovipositor jaws in dorsal view no more slender than in *P. f. fenestralis*, in lateral view more elongate and regularly falciform distad of the shoulder, slender: ventral ovipositor jaws in ventral view slightly more elongate than in the typical form of the species, in profile as elongate, correspondingly, as the dorsal pair, much straighter than in *P. f. fenestralis* and more acute.

Coloration not distinctively different from *P. f. fenestralis*.

Measurements (in millimeters)

♂	Length of body	Length of antenna	Length of pronotum	Length of tegmen	Length of caudal femur
<i>P. fen. fenestralis</i>					
Wood's Hole, Mass.	16.8	13.7	3.5	18	11
Isle of Palms, So. Car.	20.8	14.2	3.9	21.2	12.5
Ship Island, Miss.	18.2	13	3.6	19.5	11
<i>P. fen. fenestralis</i> ×					
<i>P. fen. frater</i>					
Hearne, Texas.	20.7	12.5	4	21.5	12.5
<i>P. fen. frater</i>					
Galveston, Texas, <i>paratype</i>	23	17.4	4.7	23.6	14.8
Katherine, Texas, <i>allotype</i>	24	—	5.4	26.5	16.2
♀					
<i>P. fen. fenestralis</i>					
Wood's Hole, Mass.	23.5	12	4.8	20.8	12.5
Isle of Palms, So. Car.	27.2 ¹⁹	13.5	4.7	24.2	14
Ship Island, Miss.	23.8	11.5	4.5	22.7	13.2

♀	Length of body	Length of antenna	Length of pronotum	Length of tegmen	Length of caudal femur
<i>P. fen. fenestralis</i> ×					
<i>P. fen. frater</i>					
Hearne, Texas	27.5 ¹⁹	10.5	5	24.8	14.8
<i>P. fen. frater</i>					
Galveston, Texas, <i>paratype</i>	29	16.5	6.3	27.8	17.5
Katherine, Texas, <i>type</i> . . .	30.5	16.3	6.1	29	16.7
Katherine, Texas, <i>paratype</i>	37 ¹⁹	18	6.6	31.2	19
Between Alice and Browns- ville, Texas, <i>paratype</i> . . .	30.8	15.8	5.7	28.4	16.2

The individuals of *P. fenestralis fenestralis* measured above are average specimens from fair-sized series.

In addition to the type and allotype we have before us the specimens measured above, which are: an additional female from Katherine, Texas, bearing the same data as the type and allotype; a pair from Galveston, Galveston County, Texas, taken July 19 to 21, 1912, (Hebard; sandy spots back from beach), and a single female from between Alice and Brownsville, Texas, taken in July. With the exception of the latter specimen, which is from the collection of the Brooklyn Institute of Arts and Sciences, the series is contained in the Philadelphia collections. These additional specimens are considered paratypes. A series of two males and three females taken in Hearne, Robertson County, Texas, August 14 to 15, 1915, (Hebard; in moderate numbers on sandy area near woods), contained in the Philadelphia collections, is virtually intermediate between *P. fen. fenestralis* and *P. fen. frater* in the structural differential characters.

The Caeruleipennis Group of the Genus Anconia

The genus *Anconia* is made up of two groups, one centering about *A. integra*, the genotype, and the other composed of *A. caeruleipennis* Bruner and the new species here described. Bruner's *caeruleipennis*²⁰ is known only from the unique female type, which is now before us. In 1909, Rehn and Hebard referred material taken in the vicinity of El Paso, Texas, to *caeruleipennis*, having at that time only the brief description of the latter with which to work. With the type in hand we can now definitely

¹⁹ Abdomen unnaturally extended, the measurement probably ten per cent in excess of repose length.

²⁰ 1906. Biol. Cent.-Amer., Orth., ii, pp. 185, 186. [Hawthorne, Nevada.]

state that the Texas material represents a quite distinct new species, which we here describe.

Anconia hebardi new species (Plate XXVII, figs. 22, 23 and 24; plate XXVIII, figs. 21 and 22.)

1909. *Anconia caeruleipennis* Rehn and Hebard (not of Bruner), Proc. Acad. Nat. Sci., Phila., 1909, p. 155. [Franklin Mountains, Texas; El Paso, Texas.]

A near relative of *caeruleipennis* (see plate XXVII, figs. 25 and 26, plate XXVIII, fig. 20), differing in the more rugulose pronotum, which has more evident individual bullation of the prozona and metazona when seen in profile, in the interantennal portion of the frontal costa being narrower, the tegmina narrower and with a more coriaceous structure and much more closely woven venational pattern, in the more closely woven venational pattern of the wings, in the rich blue, instead of weakly bluish, color of the wing disk and in the more robust caudal femora.

Type.—♀; El Paso, El Paso County, Texas. Elevation, 3650 feet. July 10, 1907. (Rehn and Hebard; irrigated land along Rio Grande.) [Hebard Collection, Type no. 507.]

Description of Type.—Size moderately large; form moderately elongate, but meso and metathorax relatively robust, pronotum less than average size for general bulk, head small: surface of head and dorsal and lateral portions of thoracic segments rugulose.

Head with its exposed dorsal length hardly more than half that of pronotal disk, the depth of head to clypeal suture no greater than that of pronotum to ventral margin of the lateral lobes: occiput, vertex and fastigium evenly arcuate in profile; fastigio-facial angle moderately prominent, rounded, the inter-antennal production moderately flattened in profile, immediately ventrad of the insertion of the antennae the facial profile is appreciably concave, thence gently retreating ventrad to the clypeus: fastigium with its length and breadth subequal, indicated chiefly by a pair of shallow pit-like depressions caudad and a pair of triangular impressions cephalad; lateral margins weakly indicated, moderately converging caudad, more decidedly converging cephalad; median carina weak but apparent, connecting by a weakly indicated V-shaped fork with the lateral margins of the fastigium, which latter it delimits ventro-cephalad: frontal costa but faintly sulcate dorsad of the median ocellus, more distinctly so for a short distance ventrad of the same; costa faintly and broadly constricted dorsad at its junction with the fastigium, thence gently expanding to between the antennal bases, when it is slightly broader than the proximal antennal joint, thence moderately narrowing around the median ocellus, subequal for a distance to near the clypeal suture, where the subobsolete margins diverge sharply and irregularly. Eyes but moderately prominent, when seen from cephalic aspect with the width across them subequal to that across genae; basal outline of eye broad subreniform ovate, the depth faintly greater

than that of the infra-ocular sulcus. Antennae relatively short, less than the dorsal length of the head and pronotum combined, simple, slender, subdepressed proximad (except for the two proximal segments), apex appreciably cochleate ventrad.

Pronotum narrowing cephalad, broad caudad, in dorsal silhouette regularly enlarging caudad, greatest (caudal) width of metazonal disk slightly less than greatest length of disk; in profile the prozonal (*sensu latiore*) portion of disk is moderately but very appreciably sub-bullate, higher cephalad than caudad, in section subtectate, metazonal section gently arcuate in profile, but not at all bullate: surface of pronotum irregularly, but generally transverse, rugulose on prozona; cribroso-punctulate on metazona, lateral lobes as well as disk: cephalic margin of disk weakly obtuse-angulate, the immediate angle narrowly truncate, small but appreciable and well-spaced strumositities beading the cephalic margin of disk and to an extent on dorsal section of lateral lobes; caudal margin of disk broad sub-arcuate obtuse-angulate, the margins appreciably sinuate, cingulate: metazona almost one and a half times the prozonal length: median carina of disk delicate but evident, although subobsolete shortly cephalad of the transverse sulcus, weakly subcristate near cephalic margin; lateral carinae obsolete, on prozona represented solely by several small nodes; metazonal shoulders decided but broadly rounded, non-carinate: usual median mesozonal elevation weakly indicated by a sublongitudinal horse-shoe shaped area outlined by carinulations, little distinct, however, in the general subtumidity of that section: principal transverse sulcus deeply impressed, the prozonal sulci evident, but less deeply, on the lateral portions of disk and lateral lobes, obsolete near median line. Lateral lobes of pronotum with greatest depth subequal to greatest dorsal length, the greatest depth caudad; cephalic margin moderately sinuate; ventro-cephalic angle narrowly rounded rectangulate; ventral margin arcuate-emarginate cephalad, with the ventro-caudal angle moderately arcuate; caudal margin nearly straight, faintly oblique: surface of prozona of lobes in general smoother than metazona, but with several obliquely disposed subacute, though relatively low, nodes.

Tegmina but slightly surpassing the apex of the abdomen, their greatest breadth contained slightly more than five times in their length: texture markedly coriaceous proximad and mesad, becoming more transparent in distal portion: areolation as a whole close, very close in the coriaceous section, distad the individual areolae average nearly quadrate: costal margin with a distinct and rather elongate, though but moderately deep, proximal lobation, in distal third the margin is regularly arcuate to the rounded rectangulate apex, where the tegmen is but two-fifths as wide as at widest point; sutural margin in general nearly straight, distal concavity appreciable but very slight; distal margin strongly oblique, moderately arcuate: intercalary vein distinct, proximad equidistant from the median and ulnar veins, distad quite close to the median vein: anal field broad, at widest point equal to two-fifths of the entire tegminal width. Wings moderately elongate, their greatest width contained one and four-fifths times in the greatest length of the same; apex rounded rectangulate; axillary field arcuate lobulate: areolation of anterior

and axillary fields regular, close, relatively small, the areolae in general quadrate, proximad the cross-veins are very close and much more numerous than in *A. caeruleipennis*.

Interspace between the mesosternal lobes quadrate, slightly transverse, the margin of the lobes rounded meso-caudad: interspace between the metasternal lobes moderately transverse, faintly narrower than the mesosternal interspace. Ovipositor jaws relatively heavy, subcompressed, little recurved, jaws blunted.

Cephalic and median limbs of medium length. Caudal femora of average form, in length slightly more than half the length of the tegmen, greatest depth contained three and three-quarters times in the greatest length; lamellation of dorsal carina weakly indicated in proximal half; external pagina regularly and sharply pictured: caudal tibiae slightly shorter than the caudal femora, armed on the external margin with eight to nine spines, on internal margin with ten to eleven spines, the internal spines slightly longer than external spines, the internal spines appreciably curved: caudal tarsi short, metatarsus subequal in length to the remaining tarsal joints.

Allotype.—♂; El Paso, El Paso County, Texas. Elevation, 4200 feet. July 11, 1907. (Rehn and Hebard; edge of mesa.) [Hebard Collection.]

Description of Allotype.—Differing from the description of the female in the following noteworthy features. Size relatively and proportionately small: form more slender than in female sex. Fastigium slightly more longitudinal than in female, excavation of fastigium and prominence of median carina more evident than in female sex; frontal costa of the general type of the female but narrower, with the constriction subobsolete, sulcation distinct, quite deep and continuous from fastigium to a short distance dorsad of the clypeal suture: width across eyes very distinctly greater than that across genae, the latter nearly vertical. Eyes large, very prominent, the depth equal to one and one-half times that of the infra-ocular sulcus. Antennae slightly longer than the length of the head and pronotum, very faintly enlarged distad. Tegmina surpassing the apex of the abdomen by slightly more than the combined length of the head and pronotum, greatest width of tegmen contained nearly six times in greatest length of same, width of tegmen at distal margin about half that at point of greatest width. Wings with the greatest width contained twice in the greatest length of the same. Interspace between the mesosternal lobes quadrate, faintly transverse: interspace between the metasternal lobes quadrato-cuneate. Caudal tibiae with nine external and ten internal spines.

General color tillul-buff to vinaceous-buff, occasionally with head and thorax, as well as proximal portion of the tegmina, but all to variable degrees, washed with very weak chamois to cinnamon-buff, the face frequently nearly hoary white. Venter and abdomen largely hoary white in individuals not discolored, dorsal surface of abdomen washed proximad with orient blue and deep orient blue to porcelain blue, this variable in depth and always extending distad as a thread for a considerable distance along the dorsal carina of the abdomen. Eyes ochraceous-buff to buckthorn brown. Antennae

obscurely annulate ochraceous and dull brown, occasionally washed with rufescent. Rarely the fastigium, face and genae obscurely and rather minutely mottled with greenish blue and rufescent. Pronotum with caudal margin of disk obscurely and sparsely beaded with dark, rarely the vicinity of the humeral shoulders is washed with rufescent; occasionally the disk is obscurely and finely mottled with pale greenish. Tegmina with rather obscure markings of bone brown, which are as a rule areolate, forming, however, three principal groupings or broken transverse bands, one at proximal fourth, one mesad and the third near the distal third; these bands are not at all complete, are irregular in outline and more evident in the male sex than in the female; the distal one is obsolete in several specimens and the distal section and the anal field are supplied with a variable number of areolae of the darker color, these not strongly contrasted. Wings with disk a beautiful chapman's blue, regularly paling distad, the blue much less extended on anterior field than elsewhere; no wing-band present; veins along costal margin, in the usual position of the spur, and in the areas which are distad of the wing band in species so supplied, fuscous. Limbs largely hoary white, clouded, subannulate and mottled to variable degrees with weak dull blue-gray; carinae of caudal femora sparsely and irregularly beaded with blackish brown; genicular arches of caudal femora yellow ocher, bordered ventrad by a broad patch of dull fuscous; caudal tibiae hoary white with a faint wash of pale veronese green, proximad with bluish gray cloudings; spines brownish distad, black tipped. Ovipositor jaws tipped and margined with bone brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Length of tegmen	Length of caudal femur
El Paso, Texas, <i>paratype</i>	23	4.9	4.3	24.5	12.3
El Paso, Texas, <i>allotype</i>	23.4	5	4.2	25.2	13.3
♀					
El Paso, Texas, <i>type</i>	40.6	7.2	6.2	34	18.5
El Paso, Texas, <i>paratype</i>	39.3	7	6	34	18
Franklin Mountains, Texas, <i>paratype</i>	33.5	7	5.8	31.5	17

All of the material of this species which we have seen has already been reported by Rehn and Hebard. We have at this writing nothing further to add to the habitat information already published. All of the nine specimens (two males, seven females) previously reported are now before us and are, other than the type and allotype, considered paratypes.

We take great pleasure in dedicating this beautiful, interesting and rare species to our colleague, Mr. Morgan Hebard, as a slight token of appreciation of his excellent and indefatigable work in the field and in the laboratory, and of a friendship of many years.

EXPLANATION OF PLATES

Plate XXVI

- Fig. 1.—*Derotmema haydenii mesembrinum* new subspecies. Lateral outline of head and pronotum of male (*type*). Double Windmill, Texas. ($\times 6$)
- Fig. 2.—*Derotmema haydenii mesembrinum* new subspecies. Dorsal outline of head and pronotum of female (*allotype*). Marfa, Texas. ($\times 4$)
- Fig. 3.—*Derotmema haydenii haydenii* (Thomas). Lateral outline of head and pronotum of male. Cheyenne, Wyoming. ($\times 6$)
- Fig. 4.—*Derotmema haydenii haydenii* (Thomas). Dorsal outline of head and pronotum of female. Cheyenne, Wyoming. ($\times 4\frac{1}{2}$)
- Fig. 5.—*Derotmema piute* new species. Cephalic outline of head of female (*type*). Mason, Nevada. ($\times 4\frac{1}{2}$)
- Fig. 6.—*Derotmema piute* new species. Dorsal outline of head and pronotum of female (*type*). Mason, Nevada. ($\times 4\frac{1}{2}$)
- Fig. 7.—*Derotmema piute* new species. Lateral outline of head and pronotum of female (*type*). Mason, Nevada. ($\times 4\frac{1}{2}$)
- Fig. 8.—*Derotmema piute* new species. Lateral outline of ovipositor jaws of female (*type*). Mason, Nevada. ($\times 10$)
- Fig. 9.—*Mestobregma impexum* new species. Lateral outline of head and pronotum of male (*type*). Milford, Utah. ($\times 5$)
- Fig. 10.—*Mestobregma impexum* new species. Cephalic outline of head of male (*type*). Milford, Utah. ($\times 5$)
- Fig. 11.—*Mestobregma plattei plattei* (Thomas). Lateral outline of head and pronotum of male. Newcastle, Wyoming. ($\times 5$)
- Fig. 12.—*Mestobregma plattei plattei* (Thomas). Cephalic outline of head of male. Newcastle, Wyoming. ($\times 5$)
- Fig. 13.—*Mestobregma terricolor* new species. Cephalic outline of head of male (*type*). Pecos, Texas. ($\times 5$)
- Fig. 14.—*Mestobregma terricolor* new species. Lateral outline of head and pronotum of male (*type*). Pecos, Texas. ($\times 5$)
- Fig. 15.—*Mestobregma terricolor* new species. Dorsal outline of head and pronotum of male (*type*). Pecos, Texas. ($\times 5$)

Plate XXVII

- Fig. 16.—*Psinidia fenestralis frater* new subspecies. Lateral outline of head and pronotum of female (*type*). Katherine, Texas. ($\times 4$)
- Fig. 17.—*Psinidia fenestralis frater* new subspecies. Lateral outline of ovipositor jaws of female (*type*). Katherine, Texas. ($\times 12$)
- Fig. 18.—*Psinidia fenestralis frater* new subspecies. Dorsal view of antenna of female (*type*). Katherine, Texas. ($\times 4\frac{1}{2}$)
- Fig. 19.—*Psinidia fenestralis fenestralis* (Serville). Lateral outline of head and pronotum of female. De Leon Springs, Florida. ($\times 5\frac{1}{2}$)
- Fig. 20.—*Psinidia fenestralis fenestralis* (Serville). Lateral outline of ovipositor jaws of female. De Leon Springs, Florida. ($\times 10$)
- Fig. 21.—*Psinidia fenestralis fenestralis* (Serville). Dorsal view of antenna of female. De Leon Springs, Florida. ($\times 6$)

- Fig. 22.—*Anconia hebardii* new species. Lateral outline of head and pronotum of female (*type*). El Paso, Texas. ($\times 4\frac{1}{2}$)
- Fig. 23.—*Anconia hebardii* new species. Cephalic outline of head of female (*type*). El Paso, Texas. ($\times 4$)
- Fig. 24.—*Anconia hebardii* new species. Lateral outline of head and pronotum of male (*allotype*). El Paso, Texas. ($\times 4$)
- Fig. 25.—*Anconia caeruleipennis* Bruner. Lateral outline of head and pronotum of female (*type*). Hawthorne, Nevada. ($\times 2\frac{1}{2}$)
- Fig. 26.—*Anconia caeruleipennis* Bruner. Cephalic outline of head of female (*type*). Hawthorne, Nevada. ($\times 4$)

Plate XXVIII

The figures on this plate are reproduced natural size.

- Fig. 1.—*Derotmema haydenii mesembrinum* new subspecies. Male (*type*). Double Windmill, Texas.
- Fig. 2.—*Derotmema haydenii mesembrinum* new subspecies. Female (*allotype*). Marfa, Texas.
- Fig. 3.—*Derotmema haydenii haydenii* (Thomas). Male. Colorado Springs, Colorado.
- Fig. 4.—*Derotmema haydenii haydenii* (Thomas). Male. Near La Junta, Colorado.
- Fig. 5.—*Derotmema haydenii haydenii* (Thomas). Female. Cheyenne, Wyoming.
- Fig. 6.—*Derotmema haydenii haydenii* (Thomas). Female. Knob Hill, Colorado Springs, Colorado.
- Fig. 7.—*Derotmema haydenii rileyianum* (Saussure). Male (*topotype*). Salmon City, Idaho.
- Fig. 8.—*Derotmema haydenii rileyianum* (Saussure). Female. Baker City, Oregon.
- Fig. 9.—*Derotmema piute* new species. Male (*paratype*). Mina, Nevada.
- Fig. 10.—*Derotmema piute* new species. Female (*paratype*). Mina, Nevada.
- Fig. 11.—*Mestobregma plattei plattei* (Thomas). Male. Newcastle, Wyoming.
- Fig. 12.—*Mestobregma plattei plattei* (Thomas). Female. Newcastle, Wyoming.
- Fig. 13.—*Mestobregma impexum* new species. Male (*paratype*). Milford, Utah.
- Fig. 14.—*Mestobregma impexum* new species. Female (*allotype*). Milford, Utah.
- Fig. 15.—*Derotmema piute* new species. Female (*paratype*). Mason, Nevada.
- Fig. 16.—*Mestobregma terricolor* new species. Male (*paratype*). Pecos, Texas.
- Fig. 17.—*Mestobregma terricolor* new species. Female (*paratype*). Pecos, Texas.
- Fig. 18.—*Psinidia fenestralis frater* new subspecies. Male (*paratype*). Galveston, Texas.
- Fig. 19.—*Psinidia fenestralis frater* new subspecies. Female (*paratype*). Katherine, Texas.
- Fig. 20.—*Anconia caeruleipennis* Bruner. Female (*type*). Hawthorne, Nevada.
- Fig. 21.—*Anconia hebardii* new species. Male (*allotype*). El Paso, Texas.
- Fig. 22.—*Anconia hebardii* new species. Female (*type*). El Paso, Texas.

NEW GENERA AND SPECIES OF MELANOPLI FOUND
WITHIN THE UNITED STATES (ORTHOPTERA;
ACRIDIDAE)

BY MORGAN HEBARD

Part II

This is the second of a series of papers on undescribed Melanopli found in the United States. It was originally intended to include in the first paper, published in June, 1918,¹ all of the new forms found in the Philadelphia Collections, except those of the genus *Melanoplus*, but active duty in the Army prevented completion of the work to that point. Two new genera, ten new species and one new geographic race were there described. In the present paper twelve new species and one new geographic race are described, carrying this work through the first group of the genus *Melanoplus* with two eastern species in addition.

As in the first paper, the sequence of species described is in accordance with the revised arrangement of the species, from the preliminary studies already completed for the North American Melanopli.² Scudder's grouping of many of the forms has been found incorrect, and, particularly in the genus *Melanoplus*, his "Series" are in so many cases composed of widely separated species, that we have been obliged to institute a very different arrangement and have decided to rearrange the species into units which we have given "Group" designation. It should, therefore, be borne in mind that our Groups do not in any way correspond to Scudder's "Series."

¹ Trans. Am. Ent. Soc., xlv, pp. 141 to 169.

² We would note that our monotypic genus *Argiacris*, described in our first paper, comes between *Asemoplus* and *Bradynotes*. This genus was there described, in order to be able to make known one of the most distinctive units found among the undescribed forms at hand. One of our statements concerning this genus is, in part, incorrect. It is not distinguished from *Podisma* by the produced caudal margin of the pronotum, for in *Podisma*, as in *Melanoplus*, some of the groups are comprised of species which have the caudal margin of the pronotum angulate produced, while others have it weakly emarginate to different degrees.

A detailed discussion of the problems found in the genus *Melanoplus* will be given at a later date. For the present we would remark only one vital error in Scudder's treatment. That author's efforts were concentrated in an attempt to find some valid character to separate *Melanoplus* from *Podisma*. He determined the fact that the typical species of *Melanoplus* had a narrow mesosternal and metasternal interspace, while in typical species of *Podisma* these intervals were wider. Further study showed that this was not universal, but he considered it the most satisfactory feature for the generic assignment of species, and separated *Melanoplus* from *Podisma* thereby in his key.

After careful study of the situation, we have found that the width of the mesosternal and metasternal interspaces is subject to such individual variation that it is frequently of no diagnostic value, even for specific separation. In addition, we note that the forms of the Melanopli developed in a temperate environment have in the great majority of cases the mesosternal and metasternal interspaces narrow, while those developed in an arctic or arctic alpine environment have these interspaces usually broad. As a result, we find that arctic or arctic alpine species of *Melanoplus* have the mesosternal and metasternal interspaces fully as broad as in the species of *Podisma*, the majority of the species of which genus are found in arctic or arctic alpine regions. We are unable to find a single diagnostic feature to separate these genera. That *Melanoplus* and *Podisma* represent two distinct units is clear. In each case the genus divides into numerous sections, many of which are readily separable from the others by distinctive features. In fact we again find a situation much resembling that which occurs in the Tettigoniid genera *Conocephalus* and *Orchelimum*, and of which Rehn and Hebard have said, "Material of the two genera is easily separated by a decidedly different general appearance, but when the characters of the two are compared, the variation in each genus leaves us unable to state a single absolute difference."

As a result of Scudder's misconception of the significance of the widening of the mesosternal and metasternal interspaces, that author assigned to *Podisma* the following species, all of which are clearly members of the genus *Melanoplus*: *nubicola* Scudder, *stupefacta* Scudder, *dodgei* (Thomas), *ascensor* Scudder,

marshallii (Thomas), *oregonensis* (Thomas) and *frigida* (Boheman). Puschnig has more recently described still another European species of *Melanoplus* as a *Podisma*, this being *prossenii* from the Eisenhut in Carinthia.

We would remark that, as a result of the above assignments, all of the North American species remaining in the genus *Podisma* have the caudal margin of the pronotum concave and entirely lack organs of flight. To the genotype of *Podisma*, which is *pedestris* (Linnaeus), three North American species of *Asemoplus*, *hispidus* (Bruner), *somesi* here described and *rainierensis* Caudell, show a strong general similarity, but, in our opinion, represent a section of another valid unit. This unit, however, is almost as difficult to define as those discussed above.

In the preparation of the present paper we have met with most kind and hearty cooperation from many of our fellow workers. We are particularly indebted to Dr. E. M. Walker of the University of Toronto, Mr. Wm. T. Davis of New York and Mr. M. P. Somes, now of Kalispell, Montana. These gentlemen have furnished material which has increased the number of undescribed forms studied and has assisted in important comparative studies.

It must also be remembered that very large series are now assembled for a study of the North American Melanopli, and that these have proved invaluable in preparing the present series of preliminary papers. Without the opportunity to study these series, we would not be able to handle the problems involved with anything like the assurance we now consider ourselves justified in feeling. For the opportunity to study very important sections of these series we are deeply indebted to Mr. James A. G. Rehn of the Academy of Natural Sciences of Philadelphia, Dr. Samuel Henshaw of the Museum of Comparative Zoology and Mr. A. N. Caudell of the United States National Museum. In the present paper one thousand and forty-three specimens are recorded, one thousand and eleven of these belonging to the Philadelphia Collections.

Hesperotettix pacificus capillatus³ new geographic race (Plate XXIX, fig. 1.)

1897. *Hesperotettix pacificus* Scudder, Proc. U. S. Nat. Mus., xx, p. 61. (In part.) [♀; San Buenaventura, California.]⁴

The present geographic race and *pacificus pacificus* Scudder, both show considerable size, tegminal and color variation. Considering the fact that, as is usual in the present genus, the male genitalia show no differential characters, the characterization of these races is difficult. The series at hand, however, offer such convincing proof that separation must be made, that we feel no hesitancy in describing the present race.

This race is clearly a depauperate condition of the species and will probably be found locally distributed along the Californian coast, from Monterey Bay southward to the Santa Barbara Channel. The size averages smaller, the surface is not as smooth and the hairy covering is generally more pronounced, the antennae average distinctly shorter and the caudal femora are slightly less enlarged proximad, than in *pacificus pacificus*.

Both races develop a green, pale brown and dark brown color form. In the green condition of the present race no broad reddish annuli of the cephalic and median femora and broad pre-genicular reddish annulus of the caudal femora are found, which markings are usually met with in this phase of typical *pacificus*, and *pacificus capillatus*, further, is normally much less brilliantly colored. In both green and brown phases this race usually has the characteristic buffy markings less conspicuous and reduced to a greater extent than is usual in *pacificus pacificus*.

Type.—♂; Del Monte, Monterey County, California. September 9 and 10, 1910. (Rehn and Hebard.) [Hebard Collection, Type no. 484.]

Size small for the genus, form slender, surface well supplied with minute pilose hairs, more thickly than is normal in *pacificus pacificus*. Eyes appreciably deeper than infra-ocular portion of the genae. Sulcation of the fastigium and frontal costa moderately decided, slightly more pronounced than in *pacificus pacificus*. Antennae short and stout for the genus, little longer than combined length of head and pronotum, shorter and stouter than in *pacificus*

³ In allusion to the normally more hairy condition found in this race, when compared with the typical race of the species.

⁴ An additional female from Scudder's series, in the Hebard Collection, labelled in pencil "Los Angeles, Cal. 1888," is referable to the present race. In this case, we believe the labelling to be incorrect, or inaccurate.

pacificus. Caudal margin of disk of pronotum obtuse-angulate produced, with immediate angle rather sharply rounded. Tegmina small elongate-oval pads, costal margin curving distad more sharply than sutural margin, forming an acute point directed dorso-caudad.⁵ Genitalia showing no features of difference from *pacificus pacificus*. Caudal femora moderately enlarging proximad, appreciably less robust there than in *pacificus pacificus*.

Allotype.—♀; same data as type. [Hebard Collection.]

Differs from the type in the following features. Size larger, form moderately stout for the genus. Sulcation of the fastigium and frontal costa weaker and broader. Antennae even shorter, distinctly shorter than the combined length of the head and pronotum, distinctly shorter and stouter than in this sex of *pacificus pacificus*. Caudal margin of pronotum forming a more obtuse angulation. Genitalia as in this sex of *pacificus pacificus*.

Measurements (in millimeters) of extremes only

♂	Length of body	Length of antenna	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
Type	15.3	6.4	4.1	2.9	1.8	9.4
Paratypes (53)	13.5–16.5	5.8–6.8	3.5–4	2.5–3.2	1.2–1.7	8.2–9.5
♀						
<i>Allotype</i>	19.8	5.7	5	3.7	2	10.7
<i>Paratypes</i> (16)	18–20.3	5.2–5.7	4.4–5	2.7–3.9	1.7–2	10–10.8

The female from San Buenaventura shows divergence toward *pacificus pacificus* only in having the caudal femora slightly heavier than is normal in the present race.

A single male of *pacificus pacificus* from Marcell, Kern County, California, shows some divergence toward the present race in the somewhat narrower tegmina and caudal femora, but in all other respects is typical.

Coloration.—Dark brown, lighter brown and yellowish green phases of coloration are found in *pacificus capillatus*. All of the males are brown and only a few show some recession in coloration; eleven of the nineteen females are brown, of the same shade as the paler males. In this phase the narrow buffy medio-longitudinal dorsal line and narrow bar or bars⁶ of the postocular portion of the genae and prozonal portion of the lateral lobes of the pronotum are distinct but not conspicuous. The external faces of the caudal femora are suffused proximad, mesad and in the pre-genicular area with dark brown, this sometimes greatly reduced, but in the majority distinct, the median and distal suffusions running across the dorsal surface as broad and distinct transverse bands.

⁵ This feature varies individually in degree, but the entire series shows smaller and narrower tegmina, with apices less evenly rounded, than is shown in the considerable series of *pacificus pacificus* at hand.

⁶ This is an individually variable feature. In the majority of specimens a narrow bar of buff is found below the broad dark bar of the prozonal portion of the lateral lobes of the pronotum. In others a trace of buff is shown also above the dark bar, and in some this is developed into a second bar of buff, as wide as or even wider than the ventral buff bar.

In the females the medio-longitudinal buffy line is broader, and in yellowish-green individuals is often conspicuously margined with brown, which is most decided on the abdomen. In this phase the buffy lateral markings are sometimes greatly reduced or wholly obsolete, as is also the dark band of the prozonal portion of the lateral lobes. In the paler brown examples the caudal femora have the darker suffusions reduced, the dorsal surface unicolorous; in the yellowish green individuals these suffusions usually disappear, rarely being weakly indicated, the dorsal surface washed with pale brown. No trace of pink pre-genicular annuli is found in the present series.

The slightly rougher surface and more numerous hairs of the majority of examples of the present race, gives the series less of the smooth and shining facies of the series of *pacificus pacificus* at hand.

Specimens Examined: 74; 54 males and 20 females.

CALIFORNIA: Del Monte and San Buenaventura.

With one exception, these specimens were taken at Del Monte by Hebard on August 20, 1909, and by Rehn and Hebard on September 9 and 10, 1910, and, excluding the type and allotype, are designated as paratypes. The female, recorded by Scudder from San Buenaventura, belongs to the United States National Museum.

At Del Monte this insect was found scarce on the shore side of the sand dunes, in low scattered grasses and bushes, where a low yellow-flowered "tar-weed" was conspicuous. In this situation more individuals were met with than elsewhere, particularly in the sand-loving Composite bush, *Chrysoma ericoides* (Less.). This race was also present, but scarce, in extensive open areas of short dry grass, where also much of the low yellow-flowered "tar-weed" was found. Orthoptera was present in great numbers in these areas, much the most abundant species being *Melanoplus microtatus*, here described, while *Melanoplus devastator* Scudder was very numerous and the species here described as *Oedaleonotus phryneicus* and *fratercula* were frequently encountered.

AEOLOPLUS Scudder

1897. *Aeoloplus* Scudder, Proc. Am. Acad. Arts and Sciences, xxxii, p. 199.

1897. *Aeoloplus* Scudder, Proc. U. S. Nat. Mus., xx, p. 68.

1916. *Aeoloplides* Caudell, Proc. U. S. Nat. Mus., xlix, p. 28.

The above synonymy is the result of Caudell's misinterpretation of the original type designation. The type of the genus is not "*Caloptenus regalis* by original designation," as stated by that author. Scudder gives *Aeoloplus regalis* as type, without

further citation of author. This species is *Aeoloplus regalis* of Scudder and not *Caloptenus regalis* of Dodge. Scudder had a species of *Aeoloplus*, which he described and referred to *regalis* of Dodge, but with uncertainty, as his comments on page 73 show. Had Scudder given *Aeoloplus regalis* Dodge as genotype, Caudell's action would have been correct; but it is the species described by Scudder, not Dodge's species, which Scudder designated as genotype. It has been ascertained that *Caloptenus regalis* Dodge is a member of the genus *Melanoplus*; *Aeoloplus regalis* Scudder has been correctly renamed by Caudell,⁷ and now stands as *Aeoloplus bruneri* Caudell, type of the genus *Aeoloplus*.

Aeoloplus eremiaphila⁸ new species (Plate XXIX, figs. 2 and 3.)

The present species is the smallest known representative of the genus. The tegmina vary from ovate, but attingent, to a half fully-developed condition. The caudal femora do not have the margin of the ventral surface produced proximad in a shielding plate. In position we would place this insect after *A. chenopodii* (Bruner) and before *A. turnbulli* (Thomas), to the latter of which species it shows nearest relationship.

Comparing series including the types of *chenopodii* and *eremiaphila*, the former species is found to be larger and slightly heavier in structure, with vertex slightly broader, eye not as large in relative proportion, in length only slightly exceeding the genae, caudal margin of pronotum much more truncate, tegmina ovate and lateral, never attingent, subapical tubercle of male subgenital plate less acute, and coloration and color pattern distinctive.

Compared with a series of the more closely related *turnbulli*, that species is found to differ in its larger size, slightly more produced vertex, distinctly smaller eye in relative proportion, which in length is about equal to or slightly less than that of the genae, less definitely atrophied tegmina and wings even in the condition of maximum reduction, presence of a green as well as a brown color phase and coloration and color pattern distinctive.

Type.—♂; Foothills of Singatse Range at Mason, Lyon County, Nevada. Elevation, 4600 feet. September 6, 1910. (Rehn and Hebard.) [Hebard Collection, Type no. 485.]

Size very small for the genus; form moderately robust, medium for the genus. Fastigium of vertex very blunt, very slightly produced; eyes prominent, in

⁷ Proc. Ent. Soc. Wash., viii, p. 134, (1907).

⁸ From *ἐρημία* and *φίλη*, a lover of the desert.

length considerably greater than the genae. Pronotum with transverse sulci apparent but not pronounced, those cephalad feeble; medio-longitudinal carina of metazona distinct; caudal margin obtuse-angulate produced with apex rounded. Tegmina small, sub-ovate, attingent pads, about as long as pronotum,⁹ with apices rather sharply rounded. Cerci simple, moderately broad and compressed at base, tapering slightly and evenly in proximal half, the distal half very slender, nearly subequal in width to the rounded apex. Sub-apical tubercle of subgenital plate decided, its apex as slender and sharply rounded as the cercal apices. Cephalic and median femora almost straight and moderately heavy, not as much bowed or as heavy as in this sex of the majority of the species of *Aeoloplus*.¹⁰ Median tibiae scarcely at all curved. Caudal femora without margin of ventral surface produced proximad in a shielding plate.

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees with the type in ambisexual features, differing in the following respects. Size slightly larger,¹¹ form appreciably heavier. Fastigium of vertex broader. Ovipositor valves with apices moderately elongate and gently curved. Cephalic and median femora longer and more slender. Median tibiae straight.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
Singatse Range, Mason, Nevada, <i>type</i>	12	3	2.9	1.9	6.9
Singatse Range, Mason, Nevada, <i>paratype</i>	12.1	3	3.6	2	6.8
Singatse Range, Mason, Nevada, <i>paratype</i>	12.4	3.3	4.7	2.1	7
♀					
Singatse Range, Mason, Nevada, <i>allotype</i>	14.3	3.3	3.2	2	7.7
Singatse Range, Mason, Nevada, <i>paratype</i>	15.1	3.6	3.3	2	7.8
Mina, Nevada	16.5	3.7	5.8	2.1	8
Mina, Nevada	15.5	3.4	6	2.2	8
Mina, Nevada	16.3	3.9	6.2	2.3	8.6
Pilot Mountains, Nevada . . .	15	3.6	5.9	2.2	8
Pilot Mountains, Nevada . . .	16.2	3.5	5.6	2	8
Pilot Mountains, Nevada . . .	16.5	3.8	5.9	2.2	8.1

⁹ The tegmina vary in the present species from this type to a half fully-developed condition. Though clearly largely individual, geographic distribution may prove to have some effect on this feature. See table of measurements.

¹⁰ Examination of the material at hand shows these to be secondary sexual features, as is the curvature of the median tibiae, differing in degree of development in the male sex of different species of the genus.

¹¹ The majority of females at hand are distinctly larger than the type.

In the examples having the longest tegmina, these organs are decidedly attenuate in their distal two-fifths, due to the fact that the costal and sutural margins show a very strong convergence in the third fifth of the tegmen.

In the condition of maximum tegminal reduction, the wings are minute and greatly atrophied. From this condition, they develop to fully as long as the tegmina in the condition of maximum tegminal development.

Coloration.—Type. Head cinnamon-buff, microscopically flecked with blackish brown; this increasing on the vertex and occiput, there forming an inconspicuous longitudinal band. Eyes clay color, microscopically marked with a network of blackish brown. Antennae pinkish cinnamon. Pronotum and tegmina sayal brown, with microscopic flecks and longitudinal streaks of bister; prozona showing an indistinct medio-longitudinal band of blackish brown, but with median carina sayal brown; lateral lobes with a longitudinal blackish suffusion dorsad before the principal sulcus. Cephalic limbs and underparts cinnamon-buff; median limbs of the same coloration but flecked with blackish brown. Caudal femora cinnamon-buff, with the three dark areas, characteristic of the species of the genus, heavy and blackish brown. Abdomen cinnamon-buff with proximal segments blackish brown proximad.

Little color variation is shown by the present series. A few individuals are somewhat recessive in coloration and in these the general coloration is clay color, with all darker markings reduced, the pronotal markings and those of the caudal femora weak and poorly defined. One such example from the Pilot Mountains has the caudal femoral markings obsolete.

Specimens Examined: 11; 3 males and 8 females.

NEVADA: Foothills of Singatse Range at Mason, Mina and Pilot Mountains, three miles east of Mina.

The series examined, in addition to the type and allotype, are considered paratypes. All were taken by Rehn and Hebard.

The desert valley at Mina, 4800 to 5300 feet in elevation, with long and very gradual alluvial slopes running down into a large central playa, proved an area of scarce insect life. But, from the several species of dense and heavily thorned, leafless bushes on the slopes, three specimens of this species were secured after long and careful search. On the same day, three miles distant in the sterile and desert Pilot Mountains, three more specimens were taken. These were found in similar thorn bushes, scattered over the almost bare slopes at the foot of precipices and at the heads of cañons, at 5500 to 5700 feet. Great numbers of these bushes were examined, the only Orthoptera there found being the few specimens of the present species, *Ligurotettix coquillettei* McNeill in moderate numbers, and a single specimen of a Decticid which has as yet not been studied.

Two days later at Mason, in a generally similar area and from similar but heavier thorn bushes, five more individuals were

secured, at elevations from 4500 to 5200 feet in the foothills of the Singatse Range. The most successful method of capturing these specimens was to tramp down the brittle thorn bushes, in which case individuals of *Ligurotettix coquillettei* McNeill would fly swiftly to other adjacent bushes, but those of the present species would appear confused and could be taken by exercising reasonable caution. When this method was not followed, these little insects were found to slip about in the dense twigs and thorns with great agility and would occasionally disappear, leaving the pursuer baffled, with hands usually well scratched.

OEDALEONOTUS Scudder

1897. *Oedaleonotus* Scudder, Proc. Am. Acad. Arts and Sciences, xxxii, p. 203.

1897. *Oedaleonotus* Scudder, Proc. U. S. Nat. Mus., xx, p. 390.

After careful consideration we find that the present genus, in addition to the species referred to it by Scudder, properly includes all the species which that author assigned to the Borekii Series of the genus *Melanoplus*, with the exception of *Melanoplus scitulus* Scudder.

The genus *Oedaleonotus* will be fully discussed at a later date. This rearrangement is noted here only in order to explain the generic assignment of the following new species.

Oedaleonotus phryneicus¹² new species (Plate XXIX, figs. 5 and 6.)

1908. *Melanoplus tenuipennis* Caudell (not of Scudder, 1897), Proc. U. S. Nat. Mus., xxxiv, p. 78. [Guadalupe, California.]

Closely related to *O. tenuipennis* (Scudder), (see plate XXIX, fig. 7), which species differs from *phryneicus* in the average lighter build, particularly in the females, decidedly weaker and less irregular median and lateral carinae of the pronotum, less decidedly inflated prozona, less decided pronotal sulci and in particular the less decided channel of the first sulcus dorsad on the lateral lobes, where its termination occurs, less decided expansion of the pronotal disk caudad, this more decided in females, and less heavily pitted metazona and corresponding portion of the lateral lobes.

Type.—♂; Del Monte, Monterey County, California. August 20, 1909. (M. Hebard.) [Hebard Collection, Type no. 486.]

Size medium for the genus, form moderately robust. Head much as in *tenuipennis*. Pronotum with median and lateral carinae and sulci decided; lateral carinae feebly concave and feebly expanding on the prozona, more

¹² From *φρύνος*=a toad, and *εἰκός*=like. In allusion to the squat, rough appearance, particularly of females of the present species.

strongly expanding caudad on the metazona; channel of the first sulcus dorsad on the lateral lobes, where its termination occurs, brief but deep, margined caudad with a conspicuous fleck of pale coloration; prozona distinctly inflated; caudal margin of disk transverse, showing a feeble obtuse-angulate emargination mesad, the two halves thus formed feebly convex. Tegmina lateral oval pads,¹³ distinctly shorter than the pronotum, well separated. Genitalia as in *tenuipennis*. Longitudinal marginal carinae of the caudal femora pronounced.

Allotype.—♀; same data as type. [Hebard Collection.]

Similar to the male type except in the following features. Size decidedly larger, form very robust. All pronotal features intensified. The lateral carinae of the disk of the pronotum show microscopic pits, which give them an irregular roughened appearance; these carinae expand throughout their length, so that the caudal width of the pronotal disk is decidedly greater than the cephalic width, and very much more closely approximates the pronotal length than in this sex of *tenuipennis*. Tegmina¹⁴ separated by a greater interspace. Ovipositor valves as in *tenuipennis*.

♂	Measurements (in millimeters)					
	Length of body	Length of pronotum	Cephalic width of pronotum	Caudal width of pronotum	Length of tegmen	Width of tegmen
Del Monte, California, type	16.5	4.1	2	3.1	2.8	1.8
Del Monte, California, paratype	15.5	3.9	1.9	3	3.2	1.8
Del Monte, California, paratype	18.5	4.7	2.1	3.3	3.8	2
Del Monte, California, paratype	19.2	4.9	2	3.2	3.2	2.1
Del Monte, California, paratype	18	4.3	2	3.2	2.8	1.8
♀						
Del Monte, California, allotype	22.8	5.8	2.7	5	3.4	2.5
Del Monte, California, paratype ¹⁵	19.5	4.9	2.5	3.8	2.6	2.2
Del Monte, California, paratype	17.2	4.4	2.6	4.1	3.2	2
Del Monte, California, paratype	16.2	4.3	2.2	4	2.7	1.8
Del Monte, California, paratype	20	5.5	2.7	4.8	3.1	2.6
Del Monte, California, paratype	22.9	6.2	2.8	5.1	4	2.6
Monterey, California	23	5.5	3.1	5.2	4	2.7

¹³ Varying in the males from elongate oval to (rarely) broad oval.

¹⁴ More variable in relative size and form than in males.

¹⁵ In this specimen the pronotal proportions are as found in *tenuipennis*, but the individual is typical of *phryneicus* in all other respects.

The measurements give the extremes of the series. The specimen doubtfully recorded as *tenuipennis* by Scudder, from Monterey County, California, is an aberrant example of that species, showing no approach toward the present insect.

We would note that in this species, as well as in *tenuipennis*, the degree of expansion of the pronotum caudad is individually variable. The amount of expansion, however, in the present species averages very distinctly greater. The swelling of the cephalic portion of the pronotum also shows some individual variation, but the present species always shows this feature to some extent, and with its rugged structure and more strongly defined carinae is decidedly distinctive in appearance.

Coloration.—*Type.* Head ochraceous-tawny becoming darker, cinnamon brown, on the occiput, with a still darker, broad post-ocular bar of mummy brown on each side. Pronotum with disk appreciably darker than lateral lobes, cinnamon brown, with lateral carinae ochraceous-buff washed with tawny; lateral lobes ochraceous-buff washed with tawny, this heavier caudad, except on dorsal half of prozona which, not including the cephalic margin, is mummy brown with a conspicuous dorso-mesal fleck of ochraceous-buff where the channel of the first sulcus terminates.¹⁶ Tegmina and dorsal surface of abdomen cinnamon brown. Cephalic and median limbs internally pinkish buff, externally clay color with irregular flecks of blackish brown, these markings heaviest distad on cephalic femora and mesad on median femora. Caudal femora sayal brown; external face with a heavy proximal area of blackish brown, another mesad which is larger and very broadly V-shaped with apex mesocephalad, and another distad, the raised carinae bounding this face pale, clay color; dorsal surface sayal brown, its external half immaculate, the heavy median carina and internal half with three broad dark bands, which continue on the internal face, disappearing there mesad; ventral surface brilliant dragon's blood red, this color suffusing also the proximal portion of the internal face. Caudal tibiae deep bluish gray green, with a broad proximal annulus of cinnamon-buff; spines whitish, tipped with black. Ventral surface cinnamon-buff.

Only a moderate degree of intensification and recession is shown by the large series at hand, the general coloration ranging from bistre, with paler portions sayal brown (intensive), to sayal brown, with paler portions clay color (recessive).

Specimens Examined: 187; 89 males, 97 females, 1 gynandromorph.¹⁷

CALIFORNIA: Del Monte, Monterey and Guadalupe.

¹⁶ This fleck is a distinctive feature in the present species; with hardly any exceptions, being conspicuous in the large series before us. Hardly ever does this marking appear in *tenuipennis*, and when present is inconspicuous.

¹⁷ This specimen is remarkable in having the entire sinistral portion from head to apex of abdomen male, the dextral portion female. As a result, due to the disparity of size in the sexes of this species, this specimen is asymmetrical throughout. This is the second gynandromorph examined by us, the first being a specimen of the Tettigoniid, *Insara elegans consuetipes* (Scudder) recorded by Rehn and Hebard, Trans. Am. Ent. Soc., xl, p. 81, (1914).

A single male at hand, from the National Museum, was taken on sugar beets at Guadalupe, Santa Barbara County, on June 24, 1906, by A. N. Caudell. Excepting two males and four females from Monterey, captured by G. P. Englehardt on August 4, 1916, the remaining series was taken at Del Monte by Hebard on August 20, 1909, and by Rehn and Hebard on September 9 and 10, 1910; excepting the type and allotype, these are considered paratypes. On both occasions the species was found common, particularly in the extensive open areas of short dry grass, where a low yellow-flowered "tar-weed" was abundant.¹⁸

Oedaleonotus fratercula new species (Plate XXIX, fig. 4)

This, the smallest species of the genus, is seen to be in some ways annectant between the other forms of the genus and the distinctive *O. fuscipes* (Scudder).

This insect agrees with *fuscipes* in general contour and appearance, and in the male sex in the absence of furcula and presence of an apical tubercle on the subgenital plate. It differs from that species in the smaller size, slightly less robust form, appreciable, though weak, lateral carinae of the pronotum and, in the male, in the supra-anal plate, which is unspecialized toward the cereal bases and the cerci, which are more slender distad.

Type.—♂; Del Monte, Monterey County, California. September 9 and 10, 1910. (Rehn and Hebard.) [Hebard Collection, Type no. 487.]

Size small, smallest of the genus; form medium, slender for the genus. Head very similar to that of *fuscipes*, eyes slightly longer than genae as in that species. Pronotum with lateral carinae weak; median carina well developed on metazona, moderately developed on proximal portion of prozona, subobsolete in intervening area; sulci moderately decided, the first the weakest; caudal margin of disk transverse, very feebly convex. Tegmina lateral, broadly oval pads, much shorter than pronotum, separated by a brief interspace.¹⁹ Furcula absent. Supra-anal plate simple, elongate, triangular with margins gently convex and apex rounded, surface with a heavy and deep medio-longitudinal sulcation in proximal two-fifths, between the raised margins of this sulcation and the lateral margins it is broadly concave. Cerci proximad broad and moderately tumid, narrowing evenly in proximal three-fifths, distal two-fifths very narrow with apex rounded,²⁰ this portion curving moderately inward. Subgenital plate with a large and moderately blunt apical tubercle.

¹⁸ See notes under *Hesperotettix pacificus capillatus* on page 262.

¹⁹ The tegmina are occasionally attingent in this sex.

²⁰ The width of the distal portion of the cerci is seen to be variable to a certain degree in the males of *fratercula* at hand.

Allotype.—♀; same data as type. [Hebard Collection.]

Similar to the male type except in the following features. Size decidedly larger; form robust, slenderest, however, for females of the species of *Oedaleonotus*. Pronotum similar, but with carinae and sulci all weaker. Tegmina very broad, sub-circular,²¹ separated by a very slightly greater interspace. Ovipositor valves normal for the genus.

Measurements (in millimeters) of extremes only

	Length of body	Length of pronotum	Caudal width of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
♂						
<i>Type</i>	11.5	2.8	1.8	1.9	1.7	7.8
<i>Paratypes</i> (64)	10.8–13.7	2.7–2.9	1.8–1.9	1.9–2.6	1.7–1.8	7.3–8
♀						
<i>Allotype</i>	14.3	3.8	2.8	2.2	2	9
<i>Paratypes</i> (70)	13–14.8	3.1–4	2.3–3	1.8–2.3	1.6–2.1	8.2–9.8

Though the series shows little variation in contour and pronotal expansion, the females exhibit decided variation in relative size of the tegmina.

Coloration.—Uniform pale avellaneous on face, genae (except for a broad post-ocular bar of clove brown and a subocular patch of the same color), ventral half of the lateral lobes of the pronotum (except a hair line of clove brown running down the second sulcus and curving cephalad in the mesal portion of this area), cephalic and median limbs (which, however, are flecked and washed with dark brown, particularly on their external faces) and underparts. Antennae avellaneous with a decided cinnamon tinge. Eyes tawny olive. Vertex and occiput, disk of pronotum (which, however, is paler toward the lateral carinae) and tegmina, saccardos umber. Dorsal half of lateral lobes of pronotum to principal sulcus occupied by a large, longitudinally rectangulate area of shining clove brown, separated from the cephalic margin by a narrow band of pale avellaneous; lateral lobes caudad of principal sulcus heavily washed with saccardos umber. Dorsal surface of abdomen avellaneous washed with saccardos umber, all but the distal segments heavily suffused laterad with blackish brown, each of which markings is invaded by an area of avellaneous meso-caudad; latero-proximal angles of subgenital plate heavily washed and flecked with blackish brown. Caudal femora clay color, external and dorsal faces crossed by three heavy, zig-zag bands of blackish brown, the two more distal of which also cross the internal face. Caudal tibiae pinkish buff washed and speckled with clay color, proximal spines blackish brown, distal (majority) spines blackish brown, buffy proximad on their convex dorsal faces.²²

A usual amount of color variation is shown in the series, the intensive extremes having the dark patch of the lateral lobes of the pronotum and bands of the caudal femora very heavy and conspicuous. A few females are very pale, one in particular being clay color fading to cinnamon-buff on the abdomen, caudal femora and tibiae, the femoral bands very weak, sayal brown, showing only on the dorsal surface.

²¹ In this sex rarely broad-ovate.

²² This varies in the series to a condition in which the entire proximal portion of the majority of these spines is buffy.

Another exceptional and striking variation, but one which is found to crop out in other species of the genus as well, is a condition in which the pronotum has a broad band of cinnamon-buff on each side dorsad on the lateral lobes along the lateral carinae of the disk, while the dorsal surfaces of the caudal femora are also cinnamon-buff except the genicular areas which are suffused with dark brown, only a trace of the dark bars remaining. Two males and eight females of the present series show this condition to varying degrees; it is very striking and as fully developed as described above in but three of these.

Specimens Examined: 136; 65 males and 71 females.

CALIFORNIA: Del Monte.

The entire series of this interesting little insect was taken by Hebard on August 20, 1909, and by Rehn and Hebard on September 9 and 10, 1910. The species was found plentiful in the flat, open, sandy country, where much low grass and a low yellow-flowered "tar-weed" was to be found. This species was also found moderately abundant on a yellow-flowered Composite bush, *Chrysoma ericoides* (Less.), growing about sand dunes near the shore.²³

Asemoplus somesi²⁴ new species (Plate XXIX, figs. 8 and 9.)

1904. *Podisma polita* Caudell (not of Scudder, 1899), Ent. News, xv, p. 63.

[♀; Kitchener Glacier on Mt. Kokanee, British Columbia.]

1907. *Asemoplus nudus* Caudell (not of E. M. Walker, 1898²⁵), Proc. Ent. Soc. Washington, viii, p. 134. [♂, ♀; Paradise Valley, Mt. Rainier, Washington.]

1910. *Podisma nuda* E. M. Walker (in part not *Asemoplus nudus* of E. M. Walker, 1898), Can. Ent. xlii, p. 333. [♂, ♀; Banff, Alberta, Canada, and referring Caudell's record of *Podisma polita* to this species.]

²³ See notes under *Hesperotettix pacificus capillatus* on page 262.

²⁴ We take pleasure in naming this species for Mr. M. P. Somes, who has done excellent work in Orthoptera in Minnesota, Iowa and Missouri, and who has frequently furnished us with material of great importance in our studies.

²⁵ Examination of the entire series of paratypes and the description and figures of *Asemoplus nudus* E. M. Walker and comparison with the type and allotype of *Pezotettix hispidus* Bruner, shows that *nudus* is an absolute synonym of the latter species. We have further learned from Dr. Walker that his original determination was *hispidus*, but that he wrote Scudder, sending material and asking if the specimens were not *hispidus*, to which a reply was received congratulating him on the discovery of a new species and making no allusion to *hispidus* whatever. Thus we find another synonym attributable largely to the carelessness of Scudder. Dr. Walker, a most careful and excellent student, was in this case the victim.

We would note that Scudder removed *hispidus* from *Pezotettix* to his new genus *Bradynotes*. This is unwarranted, the species being in no way a derivative from the *Bradynotes* stock and is best assigned to the genus *Asemoplus* as at present understood.

In general appearance the present insect shows very close similarity to *A. hispidus* (Bruner); to these species *A. rainierensis* Caudell shows also close resemblance, though having small, elongate-ovate tegmina.

From both of the above species *somesi* differs in the male genitalia having relatively large furcula, which are longer than their basal width, the lateral portions of the supra-anal plate not thickened and raised in a separate small but distinct flange opposite the cerci²⁶ and the cerci elongate and heavy proximad, very slender and scarcely tapering in the distal two-fifths. In *hispidus* the cerci are approximately as long, but taper gradually to the slightly heavier apex; in *rainierensis* the cerci are much as in *hispidus*, but proportionately shorter and frequently slightly heavier.

Females of *rainierensis* are readily distinguished by the presence of tegmina; those of *somesi* and *hispidus* show but little of differential value, this sex of *somesi* being, however, slightly heavier, with pronotal proportions slightly broader.

The three species compared above are much closer to each other than to the genotype, *montanus*, that species being readily distinguished by the more evenly convex pronotum, different coloration and color pattern and form of the male cerci, which show distinct deflection distad. Tegmina are present in *montanus*, of much the same type as found in *rainierensis*.

In linear order we would place the species as follows; *montanus*, *somesi*, *hispidus* and *rainierensis*.

Type.—♂; Upper Little St. Mary Valley, above Lake Ellen Wilson, Glacier National Park, Montana. Elevation, 6700 feet. August 9, 1918. (M. P. Some.) [Hebard Collection, Type no. 500.]

Size medium for genus, form rather stout and heavily built, surface well supplied with minute but moderately elongate pilose hairs. Head much as in *hispidus*, full; vertex moderately tumid, interspace between eyes one and one-quarter times as broad as first antennal joint, fastigium moderately depressed, frontal costa with margins feebly and broadly cingulate to below ocellus, nearly subequal in width throughout. Antennae shorter than caudal femora.²⁷

²⁶ This feature is found to exhibit a certain amount of individual variation in some examples of *A. montanus* (Bruner), *hispidus* and *rainierensis*.

²⁷ We would note that in the series at hand of both *hispidus* and *rainierensis*, individuals from lower elevations have the antennae decidedly longer than those from higher levels.

Eyes rather small, about as long as infra-ocular sulcus. Pronotum rather short, scarcely broader caudad than cephalad, with a medio-longitudinal carina weakly defined on prozona, well defined on metazona and dorsal abdominal segments; transverse sulci decided; dorsum rounding into the lateral lobes but with angulation indicated, not rounding evenly as in *montanus*, prozona quadrate, caudal margin of pronotum truncate, very feebly obtuse-angulate emarginate. Latero-caudal angle of lateral lobes sharply rounded, slightly greater than a right-angle. Tegmina and wings absent. Prosternal spine acute conical and moderately slender from its broad base.²⁸ Interspace between metasternal lobes subquadrate.²⁹ Furcula represented by a pair of parallel³⁰ rounded projections, nearly one-fifth as long as supra-anal plate, decidedly larger than the maximum developed in either *hispidus* or *rainierensis*. Supra-anal plate elongate shield-shaped, with latero-caudal angles weakly indicated; median channel broad, percurrent, moderately deep in proximal portion; lateral portions rather strongly concave, the lateral margins raised and showing a slight thickening opposite the cerci, but no lamellae as in *hispidus* and *rainierensis*. Cerci distinctly over twice as long as proximal width, heavy proximad, tapering to distal two-thirds, which portion is slender, straight,³¹ to the sharply rounded apex. Subgenital plate conical with margin toward apex scarcely elevated above lateral portions, apex notched and consequently binodose.³² Cephalic and median femora moderately inflated and slightly bowed.

Allotype.—♀; same data as type. [Hebard Collection.]

Very similar to this sex of *hispidus*, slightly heavier, with pronotum proportionately slightly broader. Larger and decidedly heavier than male, agreeing with that sex except in the following features. Eye about three-quarters as long as infra-ocular sulcus. Antennae distinctly shorter. Pronotum distinctly broader caudad than cephalad, with weak percurrent median carina cut by all the weak transverse sulci, caudal margin with obtuse-angulate emargination slightly stronger. Prosternal spine moderately blunt, conical from broad base.³³ Ovipositor valves as in *hispidus*. Cephalic and median femora not inflated, straight.

²⁸ See footnote 33.

²⁹ So great is the individual variation in the width of the interspace between the mesosternal and metasternal lobes in many species of the Melanopli that we have found these features of little or no value for diagnostic purposes.

³⁰ Divergent in one specimen from Banff, Alberta.

³¹ In one specimen of the series showing a very feeble flexure ventrad.

³² This varies in the present species, as in *hispidus*, to a condition in which this feature is obsolete. In *rainierensis* it is obsolete, though occasionally faintly indicated.

³³ In the paratypic series slightly less blunt than in the Canadian series of *hispidus* at hand, distinctly blunter than in the allotype of *hispidus* from Washington. The form of the prosternal spine, as of the mesosternal and metasternal lobes, has been found by us to be extremely variable in certain species of the Melanopli, and consequently unreliable for specific diagnostic use.

Measurements (in millimeters) of extremes only

♂	Length of body	Length of pronotum	Width of pronotum ³⁴	Length of caudal femur
Banff, Alberta (2).....	16.3-16.8	3.3-3.6	3.4-3.8	9.1-9.2
Upper St. Mary Valley, Glacier Nat. Park, <i>type</i>	17	3.3	4	10.1
Upper St. Mary Valley, Glacier Nat. Park, <i>paratypes</i> (11).....	15 ³⁵ -18.5	3.3-3.3	3.9-4	9.4-10.2
Mt. Rainier, Washington (7)....	14.8-17	3.1-3.4	3.6-3.9	9-9.7
♀				
Lake Louise, British Columbia...	22	4	5	11
Mt. Kokanee, British Columbia	18.5	3.7	4.8	10.9
Upper St. Mary Valley, Glacier Nat. Park, <i>allotype</i>	20.5	4.1	5.2	12.1
Upper St. Mary Valley, Glacier Nat. Park, <i>paratypes</i> (18).....	19-23	3.9-4.1	5-5.2	11.2-12.3
Mt. Rainier, Washington (11)....	18.9-26 ³⁶	3.8-4	4.8-5	10.5-12.1

Coloration.—Male much as in *hispidus*; blackish olivaceous above, with a yellowish stripe on each side, interrupted at the first pronotal sulcus and sometimes at the intersections of the abdominal segments, running from the dorso-caudal portion of the eyes, along the dorsum of the pronotum just above the lateral lobes and along the abdomen to the last segments. The width and intensity of these bands shows some individual variation. Face and lower half of lateral lobes of pronotum yellowish. A blackish olivaceous band on each side starts from mesad on the caudal margin of the eye, occupies the dorsal half of the lateral lobes, expanding caudal on the metazonal portion, and is continued thence on the lateral portions of the abdomen, narrowing gradually distad. Underparts yellowish. Limbs reddish brown, the caudal femora showing three weakly defined, transverse suffusions of darker brown and a pregenicular pale area, which is weakly indicated on the caudal tibiae in the portion adjacent.

Female similar in general coloration, but much less brilliant. Reddish brown above, with paler bands represented only by a somewhat paler suffusion margining the dark lateral bands dorsad. Caudal limbs with markings even weaker.

Specimens Examined: 54; 20 males, 32 females and 2 immature females. ALBERTA: Banff.

BRITISH COLUMBIA: Lake Louise and Kitchener Glacier on Mount Kokanee.

MONTANA: Upper Little St. Mary Valley above Lake Ellen Wilson, Glacier National Park.

IDAHO: Wallace.

WASHINGTON: Paradise Valley on Mt. Rainer.

³⁴ Including lateral lobes, which expand ventrad, particularly caudad.

³⁵ Specimen shrunken.

³⁶ Specimen abnormally distended.

In addition to the type and allotype, a series of eleven males, eighteen females and two immature females bearing the same data, are designated paratypes. The specimens from Banff were taken by Sanson [Walker Cln.], that from Lake Louise by Mrs. Schaeffer on July 5 [A. N. S. P.], that from Mount Kokanee by Caudell, at 9000 feet, on August 10, 1903 [U. S. N. M.], and the male from Wallace on August 5, 1917 [Davis Cln.].

The species was found at the type locality to be very numerous on coarse herbage among the rocks. It was not, however, generally distributed but occurred in isolated spots of similar ecologic conditions.

Caudell found the species with *rainierensis*, in about equal numbers, in the alpine herbage of Paradise Valley on Mt. Rainier, in July, 1906. The series taken is before us, from the National Museum and Walker Collections. It is of interest to note that though *rainierensis* was found there in great numbers by Rehn and Hebard on August 23 and 24, 1910, the present species was not met with at all.

Bradynotes kaibab³⁷ new species (Plate XXIX, fig. 12.)

The present species is closely related to *B. compacta* Morse (see plate XXIX, fig. 14), described from Ormsby County, Nevada, and to *B. pinguis* Scudder (see plate XXIX, fig. 11), the type of which is from "Reno,"³⁸ Nevada. Nearest relationship is with *pinguis*, the present insect differing in the smaller size, slightly broader form and in the male sex in the much more slender cerci. The more elongate pronotum with much more conspicuous and continuous lateral carina in *compacta*, readily distinguishes that species, in males of which the supra-anal plate is more nearly elongate triangular, the cerci much as in the present species.

The female sex closely resembles a diminutive condition of that sex of *pinguis*. The carinae of the fastigium are, however, distinct between the eyes, obsolete or subobsolete above the foveolae, a condition not found in any other species of the genus.

In the present series two males and four females have the caudal tibiae nopal red, in the other five females the proximal portions of the caudal tibiae are, to different degrees, deep bluish

³⁷ Named for the tribe of Paiute Indians who inhabited this region. The tribal name derived from kaiba = mountain.

³⁸ Probably from a high elevation in the mountains near Reno.

gray-green. This shows that the color of the caudal tibiae is of no diagnostic significance, at least in one sex of the present species.

Type.—♂; Duck Lake, Cedar Mountains, Iron County, Utah. Elevation, 9000 feet. July 14, 1917. (G. P. Englehardt.) [Hebard Collection, Type no. 501.]

Size small for the genus, not as small as in *B. excelsa* Rehn; form heavy, as in *pinguis*; surface very feebly pilose. Head broad and full, vertex gently tumid; fastigium shallowly concave, the lateral margins moderately prominent, rounded; frontal costa much as in *pinguis*, but very slightly narrower and moderately punctate, least width slightly greater than width of proximal antennal joint, shallowly sulcate, the lateral margins like those of the fastigium but slightly broader. Eye as long as infra-ocular sulcus. Pronotum as in *pinguis*, expanding moderately caudad, this stronger between first and second transverse sulci, with distinct lateral carinae on prozona not as decided as in *compacta*, median carina slightly less well developed than in *pinguis*, weak but percurrent and cut only by the principal sulcus, continued on the three succeeding dorsal segments. Tegmina and wings absent, as in all species of *Bradynotes*. Interspace between mesosternal and metasternal lobes variable.³⁹ Furcula absent. Supra-anal plate trigonal-produced⁴⁰ with medio-longitudinal and lateral concavities decided proximad, the latter the more so. Cerci as long as supra-anal plate, tapering rather strongly in proximal half; distal half slender, more slender than in *pinguis*, tapering very slightly to the rounded apex, which is more sharply rounded ventrad than dorsad. Subgenital plate as in *pinguis*; conical, lateral margins very feebly convex, then as feebly concave to apex, which is small, slightly produced and feebly notched. Cephalic and median femora slightly inflated, very feebly bowed.

Allotype.—♀; same data as type, but taken July 17, 1917. [Hebard Collection.]

Larger and more robust than male. Lateral carinae of fastigium distinct proximad between eyes, obsolete⁴¹ above the foveolae; frontal costa broader

³⁹ In the two males at hand, the mesosternal interspace is as wide as the lobes themselves in one, distinctly wider in the other; the metasternal interspace is quadrate in one, distinctly transverse in the other. These features are subject to individual variation in many species of the Melanopli and, in consequence, are of far less diagnostic value than has been supposed by Scudder and other authors.

⁴⁰ In the type this plate is narrow, with apex broadly rounded; in the paratype broader proximad, narrowing more strongly to the apex which is rather sharply rounded, forming an angle of slightly less than 90°. This much individual variability in the form of the male supra-anal plate is unusual. In the type of *pinguis*, the supra-anal plate is as long as its basal width, about intermediate in form between the present extremes, with concavities less decided.

⁴¹ Varying to subobsolete in a few specimens of the series.

and more shallowly sulcate than in male. Eye slightly shorter than infra-ocular sulcus.⁴² Pronotum much as in this sex of *pinguis*, but with very weak medio-longitudinal carina indicated throughout; pronotum considerably broadened caudad, with lateral carinae of prozona weakly defined. Succeeding segments to near apex of abdomen carinate medio-longitudinally. Ovipositor jaws much as in *pinguis*. Cephalic and median femora neither inflated or bowed.

Measurements (in millimeters) of extremes

	Length of body	Length of pronotum	Width of pronotal disk cephalad	Width of pronotal disk at principal sulcus	Length of caudal femur
♂					
Type	18	3.8	2.2	3	10.1
Paratype	16.2	3.3	2.1	3	9.7
♀					
Allotype	23	4.6	3.2	4.7	11.8
Paratypes (8)	18.7 ⁴³ -25.8	4.8-4.7	3.1-3	4.6-4.4	11.6-12

Coloration.—General coloration of dorsal surface chestnut brown to mummy brown, becoming darker laterad on abdomen in males. Ventral surface antimony yellow in males, buffy in females, discolored in the majority of the present series. Head with occiput buffy, with a medio-longitudinal and two broader suffused bars of dark greenish brown, the lateral bars diverging caudad. Lateral carinae of fastigium individually jasper red to apricot orange proximad. Other portions of head ochraceous-buff with dark punctae, except for a suffused postocular bar of blackish brown. Pronotum with cephalic and caudal margins very narrowly jasper red, varying individually to apricot orange; smooth areas on lateral lobes beneath lateral carinae of disk buffy, as are the ventral portions of the lateral lobes in recessive examples. Cephalic and median limbs buffy. Caudal femora with pagina dark brown, irregularly buffy proximad; dorso-external and ventro-external surfaces ochraceous-buff; ventral portion of genicular lobes and narrow margin of dorsal surface scarlet to scarlet red; dorso-internal surface ochraceous-buff with two weak transverse bands of dark brown, these individually variable in intensity but more prominent in males than females; ventro-internal surface brazil red, deepening medio-longitudinally to claret brown or in some examples blackish. Caudal tibiae nopal red, the spines paler and black tipped; in three females the tibiae are deep bluish gray-green proximad, while in two the tibiae are deep delft blue, paler externally and shading to vandyke red in disto-internal half.

Specimens Examined: 12; 2 males, 9 females and 1 immature male.

UTAH: Cedar Mountains and Duck Lake, Cedar Mountains, Iron County.

The present series, besides the type and allotype, are designated paratypes. All were taken by G. P. Englehardt, from July 11 to 17, 1917, in the same general region, at elevations from 8500

⁴² Varying to as long as infraocular portion of genae in some specimens.

⁴³ A shrivelled specimen.

to 9000 feet. The species was found not uncommon and rather sluggish, most frequently along open parts of a trail, among sparse growth of grasses on dry, sandy soil.

Bradynotes deplanata new species (Plate XXIX, fig. 13; plate XXX, fig. 2.)

This species is closely allied to *B. pinguis* Scudder (see plate XXX, fig. 1), differing in the smaller size, broader form, deplanate disk of pronotum with lateral carinae decided and, in the male sex, in the slightly more slender cerci.

The insect agrees with *B. compacta* Morse in the well-developed lateral carinae of the pronotum. The pronotum differs in having the disk deplanate and broader caudad, due to the fact that the lateral carinae are strongly divergent caudad between the first and second transverse sulci, thence rather strongly divergent caudad, not almost evenly and weakly divergent caudad as in *compacta*. In the male sex the cerci are not as slender as in *B. obesa* (Thomas) (see plate XXIX, fig. 10), *compacta* or *B. kaibab* here described, of the same type but more slender than in *pinguis*.

Type.—♂; Big Meadows of the Deschutes River, eighteen miles southwest of Bend, Crook County, Oregon. July, 1913. (C. H. Kennedy.) [Hebard Collection, Type no. 502.]

Size medium small for genus, slightly larger than in *kaibab*; form very heavy, heavier than in that species or in *pinguis*; surface moderately pilose. Head and eyes much as described for *kaibab*, except that the frontal costa is slightly less pinched at its juncture with the fastigium and is scantily punctate. Pronotum with disk strikingly deplanate, expanding rather strongly caudad, this greatest between the first and second transverse sulci, with lateral carinae well developed as in *compacta* and continued to near the caudal margin; medio-longitudinal carina as in *kaibab*, weak but percurrent and cut only by the principal sulcus, continued on the three succeeding dorsal segments. Tegmina and wings absent. Furcula absent. Supra-anal plate rather narrowly trigonal-produced, with apex broadly rounded, medio-longitudinal depression decided proximad, lateral concavities decided proximad. Cerci as long as supra-anal plate, of the same type as in *pinguis*, tapering to the slender apex, which is oblique truncate, the dorsal angle being obtuse-angulate but sharply rounded, the ventral angle acute-angulate but more broadly rounded, distal portion more slender than in *pinguis*, very slightly heavier than in *kaibab*. Subgenital plate conical, lateral margins almost straight to the very feebly elevated apex, which is small, slightly produced, entire. Cephalic and median femora slightly inflated, very feebly bowed.

Allotype.—♀; same data as type. [Hebard Collection.]

Larger and more robust than male. Lateral carinae of fastigium percurrent, frontal costa as deeply sulcate as in male. Eye slightly shorter than infra-ocular sulcus. Pronotum considerably broadened caudad, with disk strikingly deplanate between the lateral carinae which are weaker than in male, but heavier than in females of *pinguis*, with a very weak medio-longitudinal carina indicated throughout. Succeeding segments to near apex of abdomen medio-longitudinally carinate. Ovipositor jaws apparently much as in *pinguis*.⁴⁴ Cephalic and median femora neither inflated or bowed.

Measurements (in millimeters) of extremes only

	Length of body	Length of pronotum	Width of pronotal disk cephalad	Width of pronotal disk at principal sulcus	Length of caudal femur
♂					
<i>Type</i>	19	3.9	2.6	3.6	10.4
<i>Paratypes</i> (12)	18-19.8	3.5-4	2.2-2.6	3-3.7	10-11.1
♀					
<i>Allotype</i>	23	4.7	3.1	4.6	12
<i>Paratypes</i> (5)	20.3-23	4.5-4.9	3.1-3	4.4-4.8	11.8-12

Coloration.—Male. Head light ochraceous-buff, occiput suffused triangularly with blackish, leaving the portions toward the eyes buff, lateral carinae of fastigium brazil red proximad, thence blackish with a claret tinge, as are the lateral carinae of the frontal costa; a vertical suffusion of this color from between antennal socket and eye to clypeal suture on each side and another oblique irregular suffusion across the genae, from an olivaceous postocular bar. Disk of pronotum snuff brown, the lateral carinae claret brown; lateral lobes of pronotum buffy ventrad, meso-proximad and in two smooth areas below lateral carinae of disk, remaining portions suffused with black. Mesonotum and metanotum suffused with black except for a medio-longitudinal line of buffy, and buffy in small areas dorso-laterad, from which tegmina and wings would spring if present. Abdomen suffused with black proximad, except for a medio-longitudinal line of buffy, the black areas continued half the distance to apex of abdomen on sides, and as a narrow weak suffusion dorso-laterad, to and including the supra-anal plate, remaining portions of abdomen buffy. Cephalic and median femora buffy, in type with dorsal surface washed with brick red and cephalic face heavily marked distad with black and brick red; in other individuals almost immaculate. Cephalic and median tibiae in type buffy, with cephalic face heavily lined longitudinally with black, this indicated only by a weak proximal suffusion in other examples. Caudal femora with pagina suffused with blackish, the reticulations buffy proximad and mesad; dorso-external and ventro-external surfaces ochraceous-buff, carinae tinged with reddish, ventral margin of genicular lobes and narrow dorso-distal margin garnet brown; dorso-internal surface ochraceous-buff with three heavy transverse blackish bands, the more proximal being basal in position; ventral surface

⁴⁴ In this specimen retracted, so that only the tips project beyond the supra-anal plate.

with margins brazil red, the remaining portion black with a claret tinge. Caudal tibiae with dorso-proximal lobe strikingly salmon-orange; external face buffy except proximad, where it is deep bluish gray-green and narrowly dorsad bluish gray-green; ventral face buffy; dorsal face nopal red, except briefly suffused proximad with vandyke red;⁴⁵ internal face similar but with intensity of coloration not as great. The allotypic female is similar but not as brilliant, while the dark areas are more extensive. The pronotal disk is mars brown, the dorsal surface of the abdomen mars brown, except for a narrow medio-longitudinal line and disto-laterad, where it is cinnamon brown.

Specimens Examined: 19; 13 males and 6 females.

OREGON: Big Meadows of the Deschutes River, eighteen miles southwest of Bend.

This series was collected, in July, 1913, by C. H. Kennedy, probably in the eastern edge of the dry pine woods, covering the eastern edge of the Cascade Mountains, and given to W. T. Davis. Due to Mr. Davis' generosity, the series is now divided between the Davis and Hebard Collections and those of the Academy of Natural Sciences of Philadelphia and United States National Museum. The specimens, other than the type and allotype, are designated paratypes.

Melanoplus huporeus⁴⁶ new species (Plate XXX, fig. 3; plate XXXI, fig. 2.)

The present species belongs to the *Marginatus* Group, and shows distinctly closer affinity to *M. marginatus* Scudder, than to *M. gracilipes* Scudder.

From the long-winged *marginatus* it differs in the slightly heavier form, blunter vertex and broad oval tegmina, which frequently have the immediate apex acute and sharply rounded, but are never produced distad, with apex acute, to the degree normal in the short-winged *marginatus* variety *pauper* Scudder. In addition, males are readily separated by the form of the cerci, which in *marginatus* (see plate XXXI, fig. 1) are shorter, with apex truncate and strikingly inflated. In coloration the two species are very similar.

⁴⁵ The extent of this purplish portion varies slightly in the series. In the type of *pinguis* the caudal tibiae are nopal red, slightly paler proximad on the external face; in the allotype similar, but with a blackish green annulus below the dorso-proximal lobe. In a very large series of that species from timber line on Mt. Shasta, California, however, the tibiae are all bicolored, dark purplish proximad and red distad. This indicates that the color of the caudal tibiae in *pinguis*, and probably in related species, can not be considered of specific diagnostic value, as supposed by Scudder and used in his key, Proc. U. S. Nat. Mus. xx, p. 81, (1897).

⁴⁶ From *ὕπῳρειος* = living at the foot of the mountains.

Type.—♂; Colfax, Placer County, California. Elevation, 2450 feet. August 28, 1910. (Rehn and Hebard.) [Hebard Collection, Type no. 503.]

Size small, form slender. Head much as in *marginatus*, but with area of fastigio-facial angle distinctly less produced, the angle itself more broadly rounded. Frontal costa shallowly concave. Eye large, about two and one-half times as long as infra-ocular sulcus. Pronotum elongate, disk of equal width, with a slender but well defined and percurrent medio-longitudinal carina, lateral carinae very weakly defined, caudal margin nearly transverse, very broadly obtuse-angulate produced. Prosternal spine as in *marginatus*; small, bluntly elongate subconical. Tegmina slightly shorter than pronotum, broadly oval with immediate apex acute and sharply rounded.⁴⁷ Furcula represented by a pair of minute, slender teeth, each about twice as long as wide, with apex bluntly rounded. Supra-anal plate simple, moderately elongate trigonal, the lateral margins showing very feeble convexity, surface with a moderately broad, proximal, medio-longitudinal sulcation. Cerei elongate, weakly curving inward, about three and one-half times as long as proximal width, tapering evenly in proximal two-fifths, median fifth slender with margins almost parallel, distal two-fifths enlarged, but not swollen or truncate as in *marginatus*, enlargement due to broad convexity of dorsal margin, with blunt apex at ventral margin; the ventral margin is almost straight, very feebly concave throughout, the dorsal margin more strongly concave to distal portion, where it is convex. Subgenital plate as in *marginatus*; median section of slightly greater depth laterad than mesad, with a small but distinct tubercle mesad, at the free margin. Limbs as in *marginatus*.

Allotype.—♀; same data as type. [Hebard Collection.]

Size larger, form heavier than in male. The heavier form and less produced fastigio-facial angle as strikingly in contrast with this sex of *marginatus* as between males of these species. Fastigium of vertex and frontal costa decidedly broader and less sulcate than in male. Eye about two and one-quarter times as long as infra-ocular sulcus. Pronotum with medio-longitudinal carina not as sharp as in male. Ovipositor and limbs as in *marginatus*.

Measurements (in millimeters) of extremes only

	♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i>		14.5	3.1	2	3	2	8.2
<i>Paratypes</i> (28)		14.8-16.8	3-3.9	2-2.1	3-3.9	1.9-2.2	7.9-9.8
	♀						
<i>Allotype</i>		21	4	3	4.2	2.8	11
<i>Paratypes</i> (19)		18-22	3.6-4.8	2.6-2.9	3.3-4.9	2.1-3	9-11.3

⁴⁷ In the majority of the series attinent, varying from subattinent to feebly overlapping.

Coloration.—The males range in general coloration from ochraceous-buff, with postocular band of buckthorn brown weakly indicated on prozonal portion of pronotal lateral lobes, and flecks of the same color on the sides of the abdomen proximad, to cinnamon brown with blackish postocular bar occupying the dorsal two-fifths of the prozonal portion of pronotal lateral lobes, and sides of abdomen heavily marked with blackish latero-proximad. In the darker examples the caudal femora have the dorso-internal surface showing weakly two dark flecks, while the face, ventral three-fifths of pronotal lateral lobes and ventral surface are ochraceous-buff, in striking contrast with the dorsal surface. In intensive examples the ventral face of the caudal femora is russet, shading to mars brown mesad; in recessive individuals ochraceous-buff tinged with ochraceous-orange. The caudal tibiae are buffy, tinged with glaucous.

Females are similarly colored, the intensive condition being less often encountered. In this sex also, buffy examples are often washed with greenish, this sometimes including the pronotal disk, but usually confined to the head, lateral portions of pronotum and body and exposed surface of the caudal femora.

Specimens Examined: 49; 29 males, 20 females.

CALIFORNIA: Colfax.

The series, in addition to the type and allotype, may be considered paratypes. These specimens were taken by Rehn and Hebard on August 27 and 28, 1910, at Colfax, California, at elevations from 2450 to 2800 feet. The series was found on hillsides, in open places overgrown with low plants and particularly where much poison oak occurred, intermingled with a low sweet-smelling bush. The hillsides were clothed generally with high manzanita and other bushes, with a scattering growth of pines and other trees. In the same environment *M. lepidus* Scudder was found, both species generally scarce, but *lepidus* common and the present species scarcer in one limited area only.

Melanoplus hesperus new species (Plate XXX, figs. 5 and 6; plate XXXI, fig. 3.)

The present species belongs to the Marginatus Group and to that section including the forms closely related to *M. gracilipes* Scudder.

Nearest relationship is with *gracilipes* (see plate XXX, fig. 4); males of the present insect differ in the slightly more elongate form, much more elongate furcula, more elongate supra-anal plate, more elongate cerci, with inbent distal portion twice as long

as wide, instead of subquadrate, and even weaker blunt tuberculation of subgenital plate. Much the most important differences are found in the furecula and cerci. In size, form and general appearance this species agrees fully with *M. ligneolus* Scudder, another very closely related species. The present insect is particularly distinguished from all the forms closely related to *gracilipes* by the much more elongate furecula.

Females of these species are most difficult to separate. This sex of *hesperus* is a little more slender and elongate than females of *gracilipes*, in every way similar to females of *ligneolus* except in the very slightly more pronounced lateral carinae of the pronotum.⁴⁸

Type.—♂; San Luis Obispo, San Luis Obispo County, California. August 21, 1909. (M. Hebard.) [Hebard Collection, Type no. 504.]

Size small, but, with *ligneolus*, largest of the species closely related to *gracilipes*. Form slender, much as in *gracilipes* and in *M. huporeus* here described. Head much as in *gracilipes*, but with area of fastigio-facial angle slightly more produced, much as in *huporeus*, but with frontal costa appreciably wider, as in *gracilipes*, showing only very slight concavity toward median ocellus. Eye large, over two and one-half times as long as infra-ocular sulcus. Pronotum elongate, disk of almost equal width throughout, median carina well defined and percurrent, lateral carinae distinct though very weakly defined, not sub-obsolete as in *gracilipes* or fully as weak as in *ligneolus*, caudal margin of disk broadly obtuse-angulate produced, more produced than in *gracilipes*. Prosternal spine as in *gracilipes*; elongate, bluntly subconical. Tegmina shorter than pronotum, rather broadly oval, feebly overlapping, with apex bluntly rounded. Furecula represented by a pair of slender elongate processes, which diverge at an angle of sixty (to ninety in series) degrees, three and one-half times as long as greatest width, length contained in that of supra-anal plate slightly less than two and one-half times, width about the same in proximal two-thirds and there separated by an interval of nearly equal width, thence tapering to the acute apex. Supra-anal plate shield-shaped; surface with a deep medio-longitudinal sulcus, running through proximal two-thirds, the lateral carinae of this sulcus each with mere traces of a transverse carina externally, mesad on the plate; surface with lateral portions rather strongly concave in proximal two-thirds, beyond which two broad, longitudinal, parallel, short ridges run to the free margin just before the apex. Between the supra-anal plate and the cerci, a portion of a basal plate is extruded, this causing the lateral margins of the plate to be somewhat elevated. Cerci moderately elongate, weakly curving inward, about two and one-fourth times as long as

⁴⁸ This feature is probably of little diagnostic value, as the degree of difference noted is easily within the limits of individual variation.

basal width, tapering slightly to distal third, which is twice as long as wide, with apex rounded and external face concave, this portion similar but rounded quadrate in *gracilipes*. Subgenital plate with median section of equal depth laterad and mesad, feebly blunt conical at free margin, this weaker than in *gracilipes*, not sufficiently developed to be termed a tuberculation.⁴⁹ Limbs as in *gracilipes*.

Allotype.—♀; same data as type. [Hebard Collection.]

Size larger, form heavier than in male. Fastigium of vertex distinctly broader and less deeply sulcate than in male. Eye slightly more than twice as long as infra-ocular sulcus. Pronotum with lateral carinae even weaker than in male, but slightly more pronounced than in this sex of *lignicolus*. Ovipositor and limbs as in *gracilipes*.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i>		17.2	3.8	2	3.7	2.2	9.7
<i>Paratypes</i> (3)		16.3–16.8	3.7–3.8	2–2.2	3.3–3.9	2.1–2.1	9.3–10
	♀						
<i>Allotype</i>		19.2	4.1	2.9	4	2.8	11.9

Coloration.—Head cinnamon, except occiput which is sayal brown and a broad and sharply defined postocular band of prout's brown. Eyes cinnamon brown. Dorsum of pronotum sayal brown, paling slightly toward lateral carinae, lateral lobes with a band of prout's brown occupying dorsal third of prozonal portion, corresponding portion of metazona suffused, sayal brown, lower portions of lateral lobes cinnamon. Tegmina sayal brown, darkening gradually to cinnamon brown latero-ventrad. Abdomen cinnamon-buff with large flecks of blackish laterad on the four proximal segments. Underparts ochraceous-buff. Cephalic and median femora sayal brown. Caudal femora with pagina sayal brown, dorsal surfaces cinnamon with two proximal slightly darker areas on inner portion, remaining portions suffused cinnamon-buff. Caudal tibiae clay color.

The small series shows little color variation. The males of greater recessive coloration have the head, lower portions of the pronotal lateral lobes and dorsal surface of the caudal femora cinnamon-buff, the other portions paler to a like degree.

Specimens Examined: 5; 4 males and 1 female.

CALIFORNIA: San Luis Obispo.

⁴⁹ A large series of this species will, however, be needed to determine the value of this character. In some species, the degree of tuberculation of the subgenital plate appears to be subject to but little variation. In the closely related *M. nanus* Seudder, however, great variation in this feature occurs.

Other than the type, the three males are designated paratypes. The series was collected in a field of the sun-dried yellow grass which is characteristic of the Coast Ranges of California. The species was apparently numerous, the few specimens being secured during a brief train stop.

Melanoplus microtatus new species (Plate XXX, figs. 7 and 8.)

1909. *Melanoplus sonomaensis* Rehn and Hebard (not of Caudell, 1906), Proc. Acad. Nat. Sci. Phila., 1909, p. 468. [♂, ♀; Santa Cruz, California.]

This species belongs to the Marginatus Group and to that section including the forms very closely related to *M. gracilipes* Scudder.

Nearest relationship is with *M. nanus* Scudder, to which species close affinity is shown, though not to the degree found in *M. sonomaensis* Caudell. The insect differs from *nanus* in the average smaller size,⁵⁰ the slightly but distinctly more slender form and, in the male sex, in the distinctive form of the cerci and the contour of the supra-anal plate.

Females of these species are almost inseparable. In the present very large series of *microtatus*, it is noted, however, that all are slightly but appreciably more slender, and that the large majority are of smaller size. The tegmina also average more approximate, but show so wide a range of variation in this feature, as well as in size and in length in proportion to width, that this can not be used safely as a character for individual determinations.

Type.—♂; Del Monte, Monterey County, California. August 20, 1909. (M. Hebard.) [Hebard Collection, Type no. 505.]

Size very small, smallest of the genus; form slender, slightly but appreciably more slender than in *nanus*. Head much as in *nanus*; fastigio-facial angle slightly more produced than in *gracilipes*, as in *hesperus* here described, *nanus* and *sonomaensis*; frontal costa as in *nanus*, no wider than in *huporeus* here described, but showing only slight concavity toward median ocellus, as in all the species here referred to except *huporeus*. Eye slightly over twice as long as infra-ocular sulcus. Pronotum elongate, disk of almost equal width throughout, median carina well defined and percurrent, lateral carinae distinct though weakly defined, much as in *hesperus*, caudal margin of disk broadly obtuse-angulate produced, as in *hesperus*. Prosternal spine as in *hesperus*. Tegmina considerably shorter than pronotum, almost attinent,⁵¹ with apex rather

⁵⁰ This is the smallest species of the genus *Melanoplus* known. The smallest known examples of *M. puer* (Scudder) show a lesser length, but have a considerably greater body bulk.

⁵¹ Varying to slightly overlapping in the series of males.

broadly rounded. Furcula as in *nanus*; represented by a pair of minute, slender, tapering processes.⁵² length contained in that of supra-anal plate over three and one-half times. Supra-anal plate moderately elongate, shield-shaped, median sulcus decided to slightly beyond median point, the lateral carinae of this sulcus at median point on plate connected with lateral margins by transverse carinae, lateral margins to intersection with these carinae raised and somewhat thickened, lateral concavities deep before and beyond the transverse carinae, laterad toward apex two low, short, parallel ridges are developed, which terminate in the lateral margins of the plate.⁵³ As in *nanus*, between the supra-anal plate and the cerci, portion of a basal plate is extruded, this causing the elevation of the lateral margins of the supra-anal plate. Cerci decidedly shorter than in *hesperus*, somewhat shorter than in *nanus*, curving weakly inward with a trace of angulation at end of proximal two-thirds, slightly over twice as long as basal width, tapering strongly in proximal third, thence tapering weakly to the rounded apex, the shaft with a weak curvature dorsad, external surface of distal third deplanate, this portion about one and one-half times as long as its basal width. Subgenital plate with median section of equal depth laterad and mesad, tapering meso-distad to a well developed apical tubercle at the free margin.⁵⁴ Limbs as in *nanus*, caudal femora very slightly more slender than in *gracilipes* or *hesperus*.

Allotype: ♀; same data as type. [Hebard Collection.]

Size larger, form heavier than in male. Fastigium of vertex distinctly broader and less deeply sulcate than in male. Eye very slightly more than twice as long as infra-ocular sulcus. Pronotum with lateral carinae even weaker than in male. Tegmina separated by a very brief interval.⁵⁵ Size smaller than in *gracilipes*, form more slender, and caudal femora proportionately smaller.

⁵² Varying individually from parallel to rather strongly divergent.

⁵³ This is an intensification of the type found in *nanus*. Frequent slight individual variation is shown and in a few specimens, showing least decided contour of the supra-anal plate, little difference from *nanus* in this feature is found.

⁵⁴ Among the paratypes of *nanus*, as well as in a larger series of that species before us, the subgenital plate, though normally with a well developed apical tubercle, varies through a condition in which this tubercle is weak, to one in which the margin of the subgenital plate is rounded with no trace of a tubercle. As these species are very closely related, we might expect to find males of *microtatus* occasionally lacking an apical tubercle, but such is not the case in the very large series at hand, though some slight difference in degree is occasionally shown.

⁵⁵ In females of the present series averaging about .4 mm.; in the series of females of *nanus* averaging about .9 mm.

Measurements (in millimeters) of extremes only

♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Width of tegmen	Length of caudal femur
Del Monte, Cal- ifornia, <i>type</i> ..	11.8	2.9	1.6	2	1.7	7.3
Del Monte, Cal- ifornia, <i>para-</i> <i>types</i> (170)	11.7-14.7	2.7-3.2	1.5-1.8	1.8-2.7	1.3-1.8	7-8.8
♀						
Del Monte, Cal- ifornia, <i>allo-</i> <i>type</i>	17	3.1	2	2.3	1.8	8.8
Del Monte, Cal- ifornia, <i>para-</i> <i>types</i> (152) ..	13-18.2	2.9-3.9	1.8-2.5	2.2-3.7	1.8-2.3	8.1-10.7
Monterey, Cali- fornia	17	3.9	2.5	3.2	2.2	10

Coloration.—As described for *hesperus* on page 284, except that the type and a large proportion of the series are more intensive in coloration. In these the occiput, disk of pronotum and tegmina are blackish chestnut brown, the postocular bar and dorsal third of the prozonal portion of the pronotal lateral lobes shining black. The lateral dark markings of the abdomen are expanded and deepened into a suffused blackish band, which narrows distad, but is continued on the subgenital plate as a dark suffusion. The femora have the pagina very dark prout's brown, with an oblique line of light buff dorso-mesad and are bordered ventrad with warm buff, this widest proximad; the dark areas on the internal portion of the dorsal surface are prout's brown, while the internal face is suffused with prout's brown meso-distad and dorso-mesad. This intensive type of coloration is found in females, but not as frequently as in males.

Every gradation is shown by the series of females to a maximum recessive condition, in which the general coloration is clay color, the postocular band subobsolete on head and lateral lobes of pronotum, the dark lateral abdominal band indicated by three small suffusions of prout's brown on the proximal abdominal segments.

Specimens Examined: 327; 172 males and 155 females.

CALIFORNIA: Santa Cruz, Monterey and Del Monte.

The entire series, with the exception of three specimens, was taken at Del Monte on August 20, 1909, by Hebard and on September 9 and 10, 1910, by Rehn and Hebard. Excluding the type and allotype, these are designated as paratypes. The species was found in great numbers in extensive open areas of short, dry grass, where a low yellow-flowered "tar-weed" was

plentiful. It was, however, almost ubiquitous and in the heavy chaparral, where Orthoptera was not abundant, some of the darkest examples were secured.

One female was taken at Monterey on July 4, 1916, by G. P. Englehardt, while a pair was secured by Hebard at Santa Cruz, Santa Cruz County, on August 28, 1907. The male of this pair is somewhat atypical in having the cerci straighter and more slender distad than in any of the typical series.

Melanoplus aspasmus⁵⁶ new species (Plate XXX, figs. 9 and 10; plate XXXI, fig. 4.)

This is a striking species of the Marginatus Group. It shows no close relationship to any of the other species. The fastigio-facial angle is as blunt as in *M. gracilipes* Scudder, the furcula resemble more closely those found in *M. hesperus* here described and the cerci to some degree suggest those of *M. microtatus* here described.

The insect is the most robust of the group and is distinctive in the form of the male genitalia, particularly that of the subgenital plate, which is rounded with free margin flaring outward evenly throughout.

Type.—♂; Paso Robles, San Luis Obispo County, California. August 21, 1909. (M. Hebard.) [Hebard Collection, Type no. 506.]

Size small, slightly smaller than in *gracilipes*. Form moderately stout, distinctly the heaviest species of the Marginatus Group, many of the species of which are very slender. Surface moderately well supplied with long pile, this most noticeable on caudal limbs and subgenital plate. Head of the same type as in *gracilipes*, but not as deep, the fastigio-facial angle even blunter, the face distinctly less strongly retreating; the frontal costa wide, as wide as in *gracilipes*, showing only slight concavity toward the median ocellus.⁵⁷ Eye large, distinctly broader than in *gracilipes* or the species closely related, about two and one-quarter times as long as infra-ocular sulcus. Pronotum moderately elongate, proportionately distinctly shorter than in *gracilipes* or the related species; lateral carinae subobsolete, as in *gracilipes*; caudal margin of disk obtuse-angulate produced, with angulation rather sharp, production greater than in *gracilipes* or any other species of the Marginatus Group, but of the same type found in *M. marginatus* Scudder. Prosternal spine bluntly conical, distinctly shorter than in *gracilipes*. Tegmina attingent, broad oval with

⁵⁶ From ἀσπασμός = striking.

⁵⁷ In one paratypic male the lateral margins of the frontal costa are moderately carinate, the surface of the frontal costa resultantly shallowly concave, much as is normal in *M. huporeus* here described.

apex rather broadly rounded,⁵⁸ distinctly shorter than pronotum, attinent. Furcula represented by a pair of elongate processes, which diverge at an angle of about ninety degrees, tapering from their heavy and attinent bases to their slender and sharply rounded apices, nearly three times as long as basal width, length contained in that of supra-anal plate less than two and one-half times. Supra-anal plate trigonal shield-shaped, medio-longitudinal sulcus percurrent, but strongly defined only in proximal three-fifths, lateral portion deeply concave, the lateral margins strongly raised and thickened proximad, with a flexure at end of proximal third, thence gradually diminishing in height and weakly concave opposite apices of cerci at beginning of apical third; the apical portion beyond deplanate with a small node latero-proximad on each side. Between the supra-anal plate and the cerci a portion of a basal plate is conspicuously extruded, this causing the elevation of the lateral margins of the plate. Cerci suggesting those of *M. microtatus* here described, but distinctly more complex; about twice as long as proximal width, broad proximad, tapering strongly in proximal half, this due to the strong concavity of the dorsal margin, distal half relatively slender, of nearly subequal width, dorsal and ventral margins feebly convex to rounded apex, length about twice median (greatest) width, external surface longitudinally concave below median line. Subgenital plate with dorso-lateral angles at free margin rectangulate and rather sharply rounded, more sharply rounded and prominent than in any other species of the Marginatus Group; free margin of almost equal thickness and convexity throughout, somewhat more thickened mesad but showing no trace of tuberculation; median section of plate of almost equal depth laterad and mesad; surface flaring outward to free margin evenly throughout, this type distinctive and wholly unlike that developed in any other species of the Marginatus Group. Limbs much as in *gracilipes*, except that the caudal femora are distinctly shorter and heavier.

Allotype.—♀; same data as type. [Hebard Collection.]

Size larger, form heavier than in male,⁵⁹ resultantly heavier than in any females of the Marginatus Group. Fastigium of vertex distinctly broader and less deeply sulcate than in male. Eye proportionately much as in male. Pronotum with lateral carinae subobsolete, obtuse angulation of caudal margin somewhat broader but similarly rather sharp. Tegmina attinent (to separated by a brief interval in the series), (normally) rather broadly rounded distad. Limbs with caudal femora as distinctly shorter than in the related species as in male.

Coloration.—Male (intensive). General coloration clay color tinged with cinnamon. Eyes russet. A postocular bar, continued on the prozonal portion of the lateral lobes and broadening caudad, is shining blackish mummy brown. Tegmina tinged with cinnamon brown, particularly laterad. Proximal segments of abdomen marked dorso-laterad with moderately large maculae

⁵⁸ Normally thus in males, apex occasionally rather sharply rounded; apex averaging more broadly rounded in females.

⁵⁹ It is to be remembered that males of *aspmus* are as heavy as females of *microtatus*.

of shining blackish mummy brown. Caudal femora with internal portion of dorsal surface showing two patches of dark brown, these continued on the internal face, and pagina tinged with dark brown dorsad in corresponding position. Caudal tibiae buffy, faintly tinged with glaucous.

The series shows variation to a recessive type (one male) in which the entire insect is ochraceous-buff, the postocular bar on head and pronotum obsolete, the markings of the caudal femora subobsolete, the caudal tibiae buffy. This recessive condition is in preponderance among females of the present series, fourteen being quite as immaculate, while but two of the remainder are strongly intensive.

This color pattern and similar intensification and recession is likewise found in other species of the *Marginatus* Group, but in none have we found as large a proportion of strongly recessive examples.

Measurements (in millimeters) of extremes only

	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Width of tegmen	Length of caudal femur
♂						
Type	15.3	3.8	2	2.9	2.1	8.7
Paratypes (7)	14-15.8	3.2-3.7	2-2.1	2.6-3.7	2-2.3	8-8.8
♀						
Allotype	16.2	3.8	2.5	3.2	2.4	8.9
Paratypes (19)	15.2-18	3.7-4	2.7-2.9	2.9-3.7	2.2-2.6	8.5-9.9

Specimens Examined: 28; 8 males and 20 females.

CALIFORNIA: Paso Robles.

The entire series, which in addition to the type and allotype may be considered paratypic, was taken at Paso Robles, California, on August 21, 1909, by the author. The species was found at elevations of from 750 to 900 feet in the low, dry, sun-cured, yellow grass, on hillsides dotted with oaks. Though not common, this was the most abundant species of Orthoptera encountered at this locality.

Melanoplus acidocercus ⁶⁰new species (Plate XXXI, fig. 6.)

The present insect is a member of the Scudder Group, showing nearest affinity to *M. carnegiei* Morse (see plate XXXI, fig. 5). Compared with that species it is found to be of average larger size, showing certain differences of color pattern, while the tegmina average broader. Males are, in addition, readily distinguished by the form of the cercus: in *acidocercus* the cercus is decidedly more elongate, averaging one and one-half times as long as basal width, tapering to the acute and slender apex; in *carnegiei* the cercus is short, averaging about as long as its basal

⁶⁰ From *akis* = pointed (acute), and cercus.

width, triangular, with apex acute, but not at all slenderly produced.⁶¹

In general appearance the present insect is about intermediate between *M. scudderi* (Uhler) and *Eotettix quercicola* Hebard. It is evident that this species represents the type in the genus *Melanoplus* showing nearest approach to that section of the genus *Eotettix* which includes *quercicola* and *davisi* Hebard. The two latter species have a distinctive facies: in being more polished with coloration more brilliant, particularly in life, in showing distinctive features in color pattern and in having larger heads with antennae much more elongate.

The resemblance of the present species lies largely in the general, though not detailed, similarity of coloration, coupled with a very slightly greater smoothness than found in the allied species of *Melanoplus*.

Type.—♂; Bainbridge, Decatur County, Georgia. September 5 and 6, 1915. (Rehn and Hebard.) [Hebard Collection, Type no. 508.]

Size slightly larger, form slightly more elongate than in *scudderi*, much as in lowland series (Yemassee, South Carolina) of *carnegiei*. Fastigium of vertex and frontal costa similar, but slightly more sulcate; sulcus weak but distinct throughout, well defined between the lateral ocelli. Antennae normal, about one and three-quarters times as long as pronotum, as in *carnegiei*. Eye slightly longer than cheek, about one and three-quarters times as long as infra-ocular sulcus. Pronotum much as in *scudderi*; the precurrent median carina, cut only by principal sulcus, very slightly heavier, about as well developed as in *Eotettix davisi* and *quercicola*; caudal margin of pronotum obtuse-angulate produced (at about 120°) with angulation broadly rounded, more produced than in *Eotettix davisi* or *quercicola*. Tegmina broad oval, overlapping.⁶² Distal portion of abdomen scarcely enlarged. Furcula as in *carnegiei*, represented by two minute projections, the areas from which they spring enlarged and separated by a subrectangulate emargination. Supra-anal plate as in *carnegiei*; shield-shaped, with a decided medio-longitudinal sulcus in proximal half, lateral portions broadly concave, distal portion nearly deplanate. Cereus slightly over one and one-half times as long as basal width, margins rather

⁶¹ Some slight individual variation is shown by the series of that species at hand. One male, of two from Atlanta, Georgia, has the cercus approaching the condition found in *acidocercus* much more closely than in any other specimens. In this individual the cercus is nearly one and one-half times as long as its basal width, but much broader distad than in any specimen of *acidocercus* at hand. The other Atlanta male of *carnegiei* has perfectly typical cerci.

⁶² Varying to attingent in a very few males of the series.

decidedly convergent in proximal half, thence less strongly convergent to the acute apex, dorsal margin broadly concave, ventral margin nearly straight. Subgenital plate as in *carnegiei*; short, tapering to the bluntly rounded apex. Limbs as in *carnegiei*.

Allotype.—♀; same data as type. [Hebard Collection.]

Size decidedly larger, form decidedly more robust than in male. Resembling females of *Eolettix quereicola* except that it is smaller, with head proportionately distinctly smaller, antennae shorter, disk of pronotum showing no gloss, caudal margin of pronotum less produced and caudal tibiae less heavy. Fastigium of vertex and frontal costa wider than in male, briefly deplanate in area between lateral ocelli and antennal sockets. Eye slightly longer than cheek, about one and one-half times as long as infra-ocular sulcus. Tegmina well overlapping.⁶³ Ovipositor valves moderately elongate, moderately curved distad to their acute apices, much as in *Eolettix quereicola*, appreciably more curved than in *carnegiei*. Interspace between mesosternal lobes scarcely longer than broad. Limbs as in male but heavier, much as in females of *Eolettix quereicola*, but with caudal tibiae distinctly less strongly pilose.

Measurements (in millimeters) of extremes only

	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Width of tegmen	Length of caudal femur
♂						
Type	18.7	5	3	3.7	2.9	11.1
Paratypes(40)	18.5-20	4.8-5.2	2.9-3.1	3.2-4.6	2.8-3.2	10.4-11.6
♀						
Allotype	25	6.4	4.2	5.5	4	14.1
Paratypes(36)	22.2-25.7	5.8-6.7	3.8-4.4	4-6	3.9-4.1	12.8-14.4

Coloration.—Male. Almost identical with material of *carnegiei* from the lowland pine woods (Yemassee, South Carolina); more tawny and less grayish than highland material of that species. Face, underparts, cephalic and median limbs and lower portion of pronotal lateral lobes clay color. Antennae russet, becoming darker distad. Eyes deep chestnut. Occiput, pronotal disk and tegmina mars brown. A moderately broad, shining, black postocular band expands caudad on the prozonal portion of the pronotal lateral lobes, filling more than half that surface and continued on the metazonal portion, but there not shining. Metapleura without a pale bar. Abdomen sayal brown weakly suffused with mars brown proximad. Caudal femora sayal brown, the genicular areas and two weak transverse suffusions of the dorsal surfaces blackish. Caudal tibiae coral red, well supplied with whitish pile, spines entirely black.

In recessive males the occiput and disk of pronotum are often as pale as the caudal femora, while the transverse bands of the dorsal surfaces of the caudal femora become obsolete.

Female. Generally cinnamon; lateral lobes of pronotum and caudal femora slightly darker, mikado brown. Postocular bar subobsolete. Tegmina with veins cinnamon and interspaces verona brown. Caudal femora slightly paler

⁶³ To (rarely) subattinent in females before us.

than general coloration, pinkish cinnamon, with genicular areas warm sepia and dorsal surfaces showing two broad transverse bands of mikado brown. Caudal tibiae as in male.

In females of maximum recessive coloration the entire insect is pinkish cinnamon, the postocular bar obsolete, the tegmina and dorsal surfaces of the caudal femora practically immaculate.

Specimens Examined: 84; 41 males, 37 females and 6 immature females.

GEORGIA: Bainbridge.

The entire series of adults, in addition to the type and allotype, may be considered paratypes. The series was taken by Rehn and Hebard on September 5 and 6, 1915. The species was found common in oak shoots in areas of sandy soil overgrown with oaks, and occasional among the scant grasses and plants growing on sandy soil, in the higher areas of the long-leaf pine woods near Bainbridge. Its habits much resembled those of *scudderi*.

Although this species was the sole member of the group found generally distributed in the oak and long-leaf pine woods at Bainbridge, it was absent from the undergrowth of the long-leaf pine woods growing in the narrow strip of flood-plain bordering the Flint River. In this latter locality, among scant plants, grasses and vines, *scudderi*, instead, was found.

Melanoplus pegasus new species (Plate XXXI, fig. 8.)

1916. *Melanoplus furcatus* Rehn and Hebard (not *Melanoplus furcatus* Scudder, 1897), Proc. Acad. Nat. Sci. Phila., 1916, p. 244. [Billy's Island, Jordan's on Billy's Island and Honey Island, all in Okefenokee Swamp, Georgia.]

The present insect is closely related to *M. furcatus* Scudder (see plate XXXI, fig. 7), and belongs to the Clypeatus Group. From *furcatus* it differs in the more solid coloration, in this respect closely resembling *M. clypeatus* (Scudder), and in the form of the male cerci, which show a further specialization of the type found in *furcatus*, the branches of the forked distal portion being more elongate and slender, and the ventral branch exceeding the dorsal branch in length.

With the unique male, type of *furcatus*, and a single male of the present species before them, Rehn and Hebard were, in 1916, unable to ascertain whether the differences found were specific

or due merely to individual variation. The series now at hand is constant in these differences, sufficient in our opinion for full specific separation.

Type.—♂; Billy's Island, Okefenokee Swamp, Charlton County, Georgia. July 16 to 19, 1917. (M. Hebard.) [Hebard Collection, Type no. 515.]

Size large, form robust but graceful. Fastigium of vertex feebly sulcate, frontal costa subsulcate except at median ocellus; as in *furcatus*. Antennae elongate, nearly twice as long as pronotum. Eye large, longer than cheek, twice as long as infra-ocular sulcus. Pronotum as in *furcatus*; medio-longitudinal carina distinct but not well developed on prozona, well developed on metazona, cut by sulci; lateral margins of disk distinct, rounding into the almost vertical lateral lobes; caudal margin of disk obtuse-angulate produced with angle rounded but rather sharp. Tegmina and wings almost reaching apex of abdomen.⁶⁴ Distal portion of abdomen enlarged. Furcula indicated as weak convexities on the segment from which these appendages spring when present,⁶⁵ the segment between these broadly angulate emarginate. Supra-anal plate as in *clypeatus*; very broadly shield-shaped and minutely triangularly produced meso-distad; medio-longitudinal carina deep and narrow in proximal two-thirds, thence weak, laterad of which sulcus the plate is broadly concave. Cercus moderately heavy, narrowing rather strongly to mesal portion, thence widening as strongly, strongly furcate; dorsal portion of furcation nearly twice as long as broad, with surface weakly concave, lateral margins feebly convex, subparallel and apex truncate with angles rounded; ventral portion of furcation distinctly longer than dorsal portion, broader at base, tapering evenly to the bluntly rounded apex, the dorsal portion of this margin, particularly distad, (frequently) sublamellate. Subgenital plate as in *furcatus*; moderately shallow, free margin briefly ascendant beyond cercal apices to the apex, which is slightly elevated in consequence, truncate, over twice as broad as high. Limbs as in *furcatus*.

Allotype.—♀; same data as type. [Hebard Collection.]

Size larger, form more robust than male, averaging not quite as heavy as in females of *furcatus*. Fastigium of vertex broader and scarcely concave. Tegmina and wings reaching base of supra-anal plate.⁶⁶ Ovipositor valves much as in *furcatus*; dorsal valves moderately recurved, ventral valves very weakly decurved. Limbs proportionately as in males.

⁶⁴ In paratype males from reaching to slightly beyond base of supra-anal plate, to reaching slightly beyond apex of abdomen.

⁶⁵ In paratype males varying from practically obsolete (frequent) to having minute angulations caudad of the margin of the segment (one specimen).

⁶⁶ In paratype females showing very little variation. Two with abdomen pressed out have the abdomen extending considerably beyond the tegminal apices for this reason solely.

Measurements (in millimeters) of extremes only

	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of wing	Length of caudal femur
♂					
Type	31.8	7.6	4.6	19.7	17.8
Paratypes (23)	29.9-34.9	7.2-8	4.1-4.7	19.4-22.7	17.9-18.9
♀					
Allotype	37	8.7	5.3	21.3	21
Paratypes (12)	33.4-37.7	8.2-9.2	5-5.4	19.3-22.2	20-21.3

Coloration.—Head and pronotum chestnut brown, a narrow post-ocular bar of dark chestnut brown continued feebly along the dorsal margin of the pronotal portion of the pronotal lateral lobes. Antennae hazel, darker distad. Eyes blackish brown. Dorsal field of tegmina buffy, heavily suffused with chestnut brown, particularly proximad; lateral fields dark chestnut brown. Underparts and abdomen cinnamon brown, the latter slightly paler. Metapleura cinnamon brown, with an oblique bar of buffy. Cephalic and median femora hessian brown, a purplish-red tinge distinct. Caudal femora with pagina cinnamon brown, suffused with blackish brown at apex, ventral margin strikingly straw yellow, this bar slightly broader proximad than distad, there slightly invading the pagina itself. Ventral surface of caudal femora brick red, becoming dragon's-blood red in sulcate portion, margined externally at margin of straw yellow bar with a few black dots, which fuse into a black line proximad and distad, distad occurs a broad pregenicular annulus of light buff. Caudal femora with dorso-external surface immaculate cinnamon brown with a russet tinge; dorso-internal surface tawny, with three moderately well defined suffusions of blackish chestnut brown, one of which is proximad, the most distal the broadest. Internal surface of caudal femora proximad suffused with dragon's-blood red, shading into carnelian red dorsad, the second dorsal suffusion broader and darker in dorsal half only, the third blackish and much broader and crossing the entire internal surface, pregenicular annulus warm buff and nearly as broad, genicular area externally and internally blackish except for the lobes which are buffy. Caudal femora dragon's-blood red, except for a very narrow blackish suffusion proximad and the spines, which are wholly black.

The series of males varies in general coloration from prout's brown dorsad and tawny olive laterad, to a maximum intensive condition in which the head and pronotum are blackish chestnut brown, with a comparatively broad blackish postocular bar, while the lateral fields of the tegmina are darker than the pronotum.

The females are very similar in coloration. They are a trifle less brilliant and the markings are more suffused, while the dorsal field of the tegmina averages paler, weak ochraceous-tawny, usually with a few scattered and inconspicuous flecks of darker brown.

In the series of adults, the pale ventro-external bar of the caudal femora is a conspicuous feature, much more sharply defined than in *fureatus*, while in that

species the femoral dark areas are less solid and the median dark area extends on the pagina. The coloring of the lateral fields of the tegmina is also less solid in *furcatus*, in some specimens heavily flecked with darker brown.

Specimens Examined: 55; 24 males, 13 females, 3 immature males and 15 immature females.

GEORGIA: Billy's Island, Jordan's on Billy's Island and Honey Island, all in Okefenokee Swamp.

In addition to the type and allotype, the adults are designated paratypes. The entire series, excepting those previously recorded, was taken by the author, on Billy's Island, from July 16 to 19, 1917.

This species was found in moderate numbers, the series being taken only after long and careful search through the proper areas. It was found in thick, rich, bushy undergrowth surrounding wet depressions filled with swamp-loving trees, these areas scattered through the long-leaf pine woods. Only in these thick margining zones of rich vegetation, growing about waist high, were specimens found. The males frequently flew short distances in a direct, plunging manner, the females were less likely to fly and were more difficult to locate.

In such environment we have found that all the species related to *clypeatus* occur. Thus all are extremely local in distribution and are easily overlooked. This probably accounts for the difficulty we had long experienced in securing series of any of these species. The present species probably reaches the maximum in number of adults about the beginning of August. The latest date we have for adults is September 1 to 5.

EXPLANATION OF PLATES

Plate XXIX

- Fig. 1.—*Hesperotettix pacificus capillatus* new race. Lateral outline of male (*type*). ($\times 2\frac{1}{2}$)
- Fig. 2.—*Acolophus cremiaphila* new species. Lateral outline of male (*type*). ($\times 2\frac{1}{2}$)
- Fig. 3.—*Acolophus cremiaphila* new species. Lateral outline of tegmen of female, showing maximum tegminal development in series. Pilot Mountains, Nevada. ($\times 2\frac{1}{2}$)
- Fig. 4.—*Oedaleonotus fratercula* new species. Lateral outline of male (*type*). ($\times 2\frac{1}{2}$)
- Fig. 5.—*Oedaleonotus phryneicus* new species. Dorsal outline of pronotum of female (*allotype*). ($\times 2\frac{1}{2}$)
- Fig. 6.—*Oedaleonotus phryneicus* new species. Lateral view of female (*allotype*). ($\times 2\frac{1}{2}$)
- Fig. 7.—*Oedaleonotus tenuipennis* (Scudder). Dorsal outline of pronotum of female. San Gabriel Mountains, California. ($\times 2\frac{1}{2}$)
- Fig. 8.—*Asemoplus somesi* new species. Furcula and supra-anal plate of male (*type*). (Greatly enlarged.)
- Fig. 9.—*Asemoplus somesi* new species. Outline of cercus of male (*type*). (Greatly enlarged.)
- Fig. 10.—*Bradynotes obesa* (Thomas). Outline of cercus of male. Helena, Montana. (Greatly enlarged.)
- Fig. 11.—*Bradynotes pinguis* Scudder. Outline of cercus of male (*type*). (Same scale as fig. 10.)
- Fig. 12.—*Bradynotes kaibab* new species. Outline of cercus of male (*type*). (Same scale as fig. 10.)
- Fig. 13.—*Bradynotes deplanata* new species. Outline of cercus of male (*type*). (Same scale as fig. 10.)
- Fig. 14.—*Bradynotes compacta* Morse. Outline of cercus of male (*paratype*). (Same scale as fig. 10.)

Plate XXX

- Fig. 1.—*Bradynotes pinguis* Scudder. Dorsal view of pronotum of male (*type*). ($\times 4\frac{1}{2}$)
- Fig. 2.—*Bradynotes deplanata* new species. Dorsal view of pronotum of male (*type*). ($\times 4\frac{1}{2}$)
- Fig. 3.—*Melanoplus luporeus* new species. Furcula and supra-anal plate of male (*type*). (Greatly enlarged.)
- Fig. 4.—*Melanoplus gracilipes* Scudder. Cercus of male (*type*). (Greatly enlarged.)
- Fig. 5.—*Melanoplus hesperus* new species. Furcula and supra-anal plate of male (*type*). (Greatly enlarged.)

- Fig. 6.—*Melanoplus hesperus* new species. Cercus of male (*type*). (Same scale as fig. 4.)
- Fig. 7.—*Melanoplus microtatus* new species. Furcula and supra-anal plate of male (*type*). (Same scale as fig. 5.)
- Fig. 8.—*Melanoplus microtatus* new species. Cercus of male (*type*). (Same scale as fig. 4.)
- Fig. 9.—*Melanoplus aspasmus* new species. Furcula and supra-anal plate of male (*type*). (Same scale as fig. 5.)
- Fig. 10.—*Melanoplus aspasmus* new species. Cercus of male (*type*). (Same scale as fig. 4.)

Plate XXXI

- Fig. 1.—*Melanoplus marginatus* Scudder. Cercus of male. Ahwahnee, California. (Greatly enlarged.)
- Fig. 2.—*Melanoplus huporeus* new species. Cercus of male (*type*). (Same scale as fig. 1.)
- Fig. 3.—*Melanoplus hesperus* new species. Caudal view of subgenital plate of male (*type*). (Greatly enlarged.)
- Fig. 4.—*Melanoplus aspasmus* new species. Caudal view of subgenital plate of male (*type*). (Same scale as fig. 3.)
- Fig. 5.—*Melanoplus carnegiei* Morse. Outline of cercus of male. Asheville, North Carolina. (Greatly enlarged.)
- Fig. 6.—*Melanoplus acidocercus* new species. Outline of cercus of male (*type*). (Same scale as fig. 5.)
- Fig. 7.—*Melanoplus furcatus* Scudder. Cercus of male (*type*). (Greatly enlarged.)
- Fig. 8.—*Melanoplus pegasus* new species. Cercus of male (*type*). (Same scale as fig. 7.)